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December 20, 2001

POES IJPS

Polar-orbiting Operational Environmental Satellite (POES)

POES System Requirements For Initial Joint Polar-orbiting Operational Satellite System

December 20, 2001

Prepared by:

U.S. Department of Commerce
National Oceanic and Atmospheric Administration (NOAA)
National Environmental Satellite, Data, and Information Service (NESDIS)

NOAA/NESDIS

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GROUP: Office of System Development DATE NAME:	GROUP: Office of System Development DATE NAME:
GROUP: DATE NAME:	Prepared by: MITRETEK Systems DATE NAME: Nath Srinivas, Larry Deem

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Preface

This document comprises the NOAA/NESDIS baseline publication of the Polar-orbiting Operational Environmental Satellite (POES) System Requirements For Initial Joint Polar-orbiting Operational Satellite System (IJPS). This document is Revision 0, DCN 0 (document number NO-IJ/OSD-2001-0004R0U0).

This document identifies the IJPS requirements that are applicable to the POES system and its overall functionality, performance, design and operations to support the IJPS. The requirements stated in this document provide the basis for the allocation of requirements to POES system, segments, segment elements and to system interfaces. The intent is to provide a baseline for upgrades needed to support Metop satellite related functions required to sustain the joint NOAA/EUMETSAT IJPS system.

Future updates and revisions to this document will be produced and controlled by NOAA/NESDIS/OSD.

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1 Introduction

The National Oceanic and Atmospheric Administration (NOAA) has entered into an agreement with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) for participation in the Initial Joint Polar-orbiting Operational Satellite System (IJPS) (hereinafter referred to as the "IJPS Agreement.") In the IJPS Agreement, NOAA and EUMETSAT agree to operate their Polar-orbiting satellites in a manner beneficial to both parties and the world's meteorological community.

The IJPS is comprised of two independent, but fully coordinated, polar satellite systems. Each independent system is comprised of two satellites flown consecutively under control of its respective ground segment. In support of the IJPS, NOAA satellites NOAA-N and -N= will be flown consecutively (N' replaces N) in a polar orbit with an afternoon equatorial crossing time. EUMETSAT, working together with the European Space Agency (ESA), will develop the Meteorological Operational (Metop) series of satellites to be flown consecutively in a Polar orbit with a mid-morning equatorial crossing time. The Metop satellites comprise the space segment of the EUMETSAT Polar System (EPS). The mid-morning and afternoon satellites will have a set of jointly provided common instruments, plus additional instruments specific to each orbit, provided by NOAA and EUMETSAT for their satellites. The IJPS Agreement also commits NOAA and EUMETSAT to supporting each other's operational satellite through their respective ground segments for commanding, receiving telemetry and global data, monitoring their respective satellite on-orbit status, and exchanging data between the two polar satellite systems.

NOAA's national and international commitments for providing global environmental data are the responsibility of the National Environmental Satellite, Data, and Information Service (NESDIS). NESDIS is responsible for establishing and operating civil operational environmental satellite systems while acquiring replacement satellites and launch vehicles and launch services through interagency agreements with the National Aeronautics and Space Administration (NASA).

Since the early 1960's, NESDIS has operated and maintained Polar-orbiting environmental satellites in support of NOAA's mission. Since 1978, NOAA's Polar-orbiting Operational Environmental Satellite (POES) system has operated with a two-satellite constellation in circular, near polar, sun-synchronous orbits. The current system is operating with two fifth-generation advanced TIROS-N (ATN) satellites. NOAA-15 was launched on May 13, 1998 into a morning orbit with a nominal 0730 local solar time southbound Equator crossing time. NOAA-16 was launched on September 21, 2000 into an afternoon orbit with a nominal 1340 LST northbound Equator crossing time. In the time period for IJPS operations, NESDIS will continue to operate and maintain the POES system as described herein.

1.1 Purpose

The purpose of this document is to establish, within the NESDIS POES documentation system, the IJPS requirements that are applicable to the POES system and its overall functionality, performance, design and operations to support the IJPS. The requirements defined in this

document provide the basis for the allocation of requirements to POES system, segments, segment elements and to system interfaces.

The requirements in this document are levied by the POES Program Office on the NOAA/NESDIS organizational entities responsible for system elements, as defined in the NOAA Ground Segment Project Plan for IJPS. Each entity shall incorporate these requirements in to their overall system upgrade implementation activity in accordance with their respective requirement process.

This document also provides the baseline against which the IJPS System and the POES Ground Segment (PGS) will be verified and validated.

1.2 Scope

This document defines requirements to be satisfied by NOAA's POES system for participation in the IJPS with the EUMETSAT.

The NOAA scope of work for IJPS support entails upgrades and modifications of the existing operational NOAA POES Ground Segment. The major ground segment elements affected by IJPS are the Command & Data Acquisition station at Fairbanks, the Satellite Operations Control Center, Data Ingest and Product Processing Centers, Data Archiving Centers, and internal and external communication interfaces. All of these ground segment elements shall maintain their continued support of the heritage POES System with little or no changes.

1.3 Document Organization

Section 1.4 lists the applicable and reference documentation that provide source and input information to the scope of requirements on the POES system.
Section 2 describes the POES mission objectives that will be supported in the IJPS time period and a brief description of the baseline POES system.
Section 3 provides the formal requirement statements.
Section 4 describes the verification and validation requirements.
Appendices include: Requirement Traceability and Verification Matrix; and the Acronyms List.

1.4 Applicable and Reference Documentation

Tables 1-1 presents a list of Applicable Documents (AD-#) that contain information and/or requirements that need to be applied for the successful completion of the IJPS program.

Table 1-1 Applicable Documents

Doc #	Title	Reference Number	Issue	Date

Doc #	Title	Reference Number	Issue	Date
AD-1	Agreement Between the United States National Oceanic and Atmospheric Administration and the European Organisation for the Exploitation of Meteorological Satellites on an Initial Joint Polar-orbiting Operational Satellite System			11/19/98
AD-2	Program Implementation Plan (PIP) for Cooperation Between NOAA and EUMETSAT on an Initial Joint Polar-orbiting Operational Satellite System	EUM.EPS.MGT/980320	1	07/08/99
AD-3	EPS Core Ground Segment Interface Requirements on NOAA Ground Segment	EPS/SYS/IRD/980916	2.0	08/13/99
AD-4	NOAA Interface Requirements on EPS Core Ground Segment	EUM.EPS.SYS.SPE.990020	2.0	08/13/99
AD-5	Metop Space to Ground Interface Specification	MO-IF-MMT-SY0001	4	12/00
AD-6	Satellite to Ground Interface (NOAA-N & N')	LMAS IS 23033284		6/30/01
AD-7	NOAA Ground Segment to EPS Ground Segment Interface Control Document	TBW		
AD-8	POES Concept of Operation for IJPS	TBW		
AD-9	POES N and N' User's Guide	TBW		
AD-10	Performance Specification for the NOAA-K, L, M, N & N' Satellites	GSFC-480-25.1		11/1994

1.5 Reference Documentation

Table 1-2 presents a list of Reference Documents (RD-#) that provide additional useful information for successful program implementation.

Table 1-2 Reference Documents

Doc #	Title	Reference Number	Issue	Date
RD-1	NOAA Baseline Polar-orbiting Operational Environmental Satellite (POES) Communication and Data Acquisition (CDA) and Satellite Operations Control Center (SOCC) Equipment Configuration	NO-IJ/SO-99-0008-R0U0	#2	11/30/99
RD-2	Satellite to Ground Interface (NOAA-KLM)	LMAS IS 3278200		6/13/95
RD-3	NOAA IJPS Communications Requirements (RDN-6)	TBW		
RD-4	POES Concept of Operations for POES KLM	NOAA-POES/OSO-2001-0001R0UD0	#0	2/26/01
RD-5	EPS/POES Joint Operations Rules and Procedures (JORP)	TBW		

Doc #	Title	Reference Number	Issue	Date
RD-6	NOAA Ground Segment Project Plan for IJPS			6/99
RD-7	NOAA IJPS Master Verification and Validation Plan	TBW		
RD-8	NOAA KLM User's Guide			9/00 Revision
RD-9	Polar Operation Environmental Satellite Ground Segment Upgrade Description (RDN-5)	NO-IJ/OSD-00-0005-R0U0		5/15/2000

2 POES System Definition for IJPS

2.1 System Overview

The overall mission objectives of the POES system is to provide continuous daily global observations of weather patterns and environmental measurements of the Earth's atmosphere, its surface and cloud cover, and the proton and electron flux at satellite altitude [AD-10]. Satellite observations are accomplished with a standard (core) set of environmental instruments from Sun-synchronous orbits. Since the beginning of the POES program, environmental data and products have been provided freely to NOAA users and the world meteorological community.

The IJPS period will begin with the successful launch and commissioning of the EPS Metop-1 satellite. In the IJPS time period, the POES system will continue to support the overall NOAA mission while providing environmental data as an element of the IJPS. Continuous environmental data will be collected from POES satellites, in afternoon orbits, in support of the following mission objectives:

- Global Sounding
- Global Imagery
- Global and Regional Surface and Hydrological Observations
- Data Collection and Location
- Search and Rescue
- Space Environment Monitoring
- Ozone Monitoring

Continuous mission data collected by imagery, sounding, sea ice coverage, and ozone observations will also contribute to and support the overall mission of Climate Monitoring.

Satellite data from the common environmental instruments on the EPS morning satellite (Metop) will be processed by the POES system and distributed to users in lieu of the data from a POES morning satellite [AD-8]. The POES system will also process and distribute the environmental data received from the additional instruments embarked on EPS and POES satellites in accordance with NOAA's data processing priorities, and agreements with EUMETSAT.

The POES system is comprised of two segments, the space and ground segments. Figure 2-1 presents the breakdown of the POES system components.

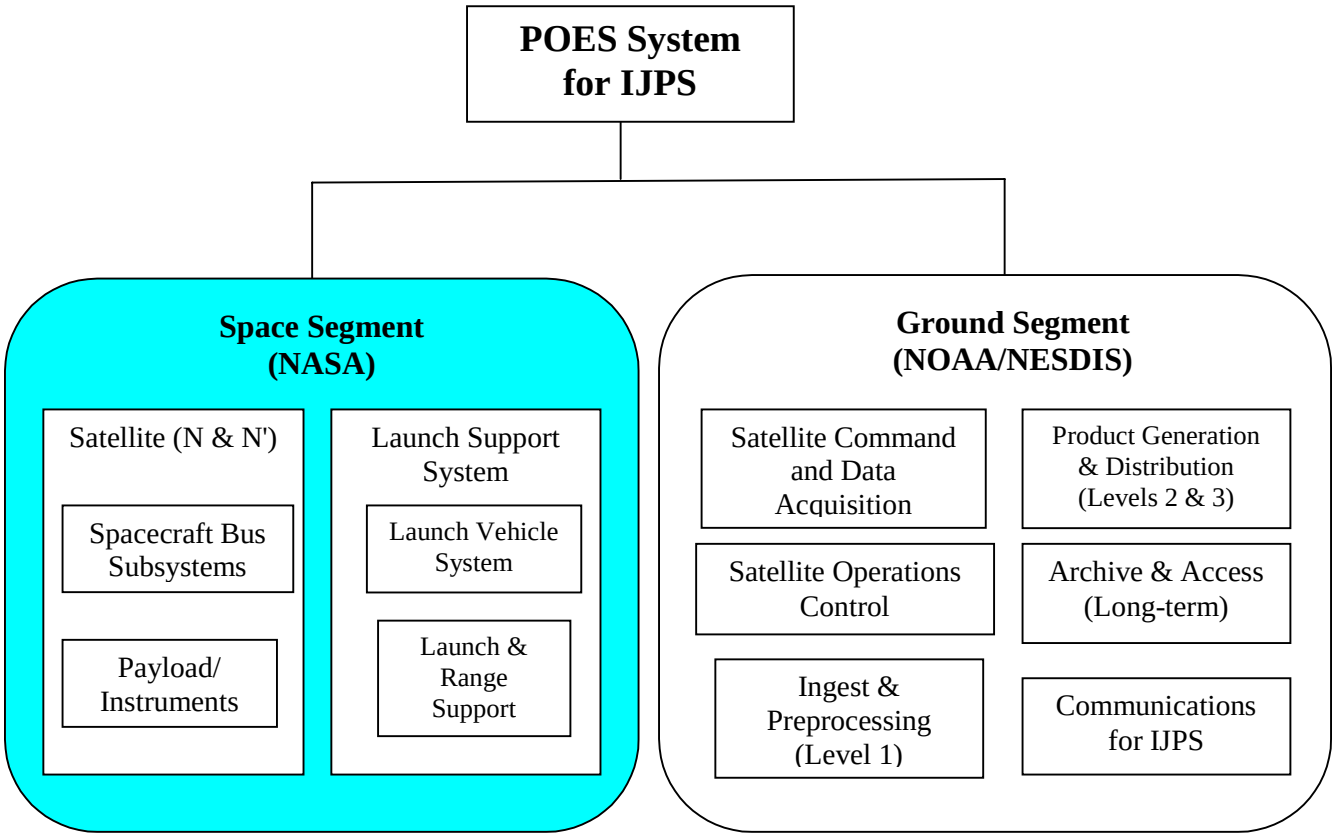

Figure 2-1 POES System Components for IJPS

2.2 Segment Overview

2.2.1 Space Segment

In the IJPS time period, the POES space segment includes the NOAA-N and -N' Satellites (part of IJPS), heritage operational satellites (not part of IJPS) and associated launch support system required to launch the satellites into their assigned polar orbits [AD-10]. The space segment procurement and implementation, including satellite launch and on-orbit verification, are primarily the responsibility of NASA.

2.2.1.1 POES Satellites

NOAA-N and -N' are among the fifth generation POES satellites that are being acquired by NASA for NOAA and designated as NOAA-15 (-K), NOAA-16 (-L), -M, -N, and -N'. Each satellite is made up of eight spacecraft bus subsystems plus payload instruments. The spacecraft bus subsystems are as follows:

- Data Handling Subsystem
- Communications Subsystem
- Command and Control Subsystem
- Attitude Determination and Control Subsystem
- Electrical Power and Distribution Subsystem
- Reaction Control Subsystem
- Thermal Control Subsystem
- Structure Subsystem

These satellites incorporate new and upgraded instruments and reliability improvements to extend their on-orbit design life to three years. The NOAA-N and -N' spacecraft will continue to use the fifth generation spacecraft baseline, upgraded with solid-state recorders.

To support the POES mission, NOAA-N and -N' will include a baseline set of instruments described in Table 2-1. This baseline set of instruments is very similar in their functionality to those carried on previous POES satellites.

Table 2-1 POES Baseline Instrumentation for IJPS

Advanced Very High Resolution Radiometer/3 AVHRR/3	Scanning imaging radiometer with six channels in the 0.6 – 12 microns, 3 visible/near infrared (IR) and three channels in the infrared region. The visible and near IR channels observe vegetation, clouds, lakes, shorelines, snow and ice, and aerosols. The other IR channels detect heat radiation from clouds, land, and water. Only 5 channels are processed at any one time with instrument being commanded to operate on either channel 3a or 3b.
High Resolution Infrared Radiation Sounder/4 HIRS/4	Scanning sounding radiometer with 19 infrared channels in the range 3 – 15 microns, and one visible channel. Radiance measurements are taken in 19 spectral regions of the IR band and one in the visible band for relatively high resolution soundings to an altitude of about 40 km.
Advanced Microwave Sounding Unit-A1/-A2, AMSU-A1/-A2	AMSU-A1/-A2-Part of microwave sounder suite with 15 channels in the range 23 – 90 GHz. AMSU-A1 - Channels 3 – 15 provide data for vertical temperature profiles. AMSU-A2- Channels 1 and 2 provide

	information on surface water and precipitation enhancing sounding measurements.
Microwave Humidity Sounder MHS	MHS-is a microwave sounder with 5 channels at 89, 150 and around 183 GHz for measuring profiles of atmospheric water vapors.
Space Environmental Monitor SEM/2	Multi-channel charged-particle spectro-meter that measures the Earth's radiation belts and the particle precipitation phenomena resulting from solar activity.
Search and Rescue Satellite Aided Tacking System SARSAT	UHF receiver and signal processor and VHF/UHF/L-Band Transponder for receiving distress signals from emergency beacons at international distress frequencies and retransmits them at 1544.5 MHz
ARGOS/Data Collection System/2 DCS/2	UHF receiver and signal processor that relays meteorological and other data transmitted from in-situ ground-based sensors.
Solar Backscatter-Ultraviolet Spectral Radiometer/2 (unique to NOAA satellites) SBUV/2	Ultraviolet nadir-staring, non-spectral scanning spectrometer that measures backscattered solar radiation in the ultraviolet Hartley-Huggins bands. Measurements provide basis for determining the total ozone concentration and its vertical distribution in the atmosphere.

With the exception of the SBUV instrument (unique to NOAA satellites), the above instrument-types are part of a common "core" set of instruments to be flown on both POES and EPS (Metop) satellites.

Several of the core instruments on NOAA-N and –N' will differ from the current POES series, NOAA-KLM. The following instruments will be either upgraded or replaced as follows:

- HIRS/3 will be upgraded to HIRS/4 with a smaller field of view, but the same sampling distance.
- Microwave Humidity Sounder (MHS) will replace the AMSU-B unit measuring scene radiance in 5 microwave bands.
- DCS/2 will be embarked on NOAA-N and will be upgraded for NOAA-N' with an Advanced DCS (A-DCS) unit.
- SARSAT processor (SARP-2) on NOAA-N will be upgraded to a new configuration (SARP-3) for NOAA-N'.

Heritage NOAA satellites, that are still in operation in the IJPS period, will require continued support from the POES ground segment.

2.2.1.2 Launch Support System

The launch support system is comprised of the launch vehicles for NOAA-N and -N' and all support and services required to place those satellites into their desired orbit. POES are launched into orbit by an space launch vehicle system (SLVS) provided by NASA that can satisfy all mission requirements. NOAA-N and -N' will be launched into orbit by the Delta SLVS. NOAA-M is currently scheduled for launch in 2002 using the Titan II system.

The Western Range will provide range support services during prelaunch and launch operations for all POES satellites. In addition, NASA's Deep Space Network and the Air Force's Satellite Control Network/Facility will also provide support during launch to early orbit operations.

2.2.2 Ground Segment

The current POES Ground Segment (PGS) baseline includes Command and Data Acquisition (CDA) stations located at Fairbanks, and Wallops, and the Satellite Operations Control Center (SOCC) and Central Environmental Satellite Computer System (CEMSCS) located in Suitland [RD-1]. Also included in the baseline are NESDIS Level 2 product generating systems and long-term archive/access facilities.

The Fairbanks and Wallops CDAs have the capability to serve as operational backup facilities to the SOCC for satellite command and control functions. At present, operational plans [RD-4] designate Wallops as the primary backup site to support SOCC for these functions.

CEMSCS, information technology capabilities within NESDIS that are organizationally part of the Information Processing Division (IPD), includes the Ingest and Preprocessing Systems (IPS) and Product Generation and Distribution Systems (PGD) functions. CEMSCS also houses the on-line storage system called the Satellite Active Archive (SAA), which stores Level 1 and 2 data sets for users.

Also within NESDIS are products produced by Product Generating Systems that are external to CEMSCS. These systems obtain the Level 1 data sets generated by the CEMSCS and process products to Level 2 and beyond.

Archive and Access (long-term storage) functions are distributed among several NESDIS facilities. The National Climatic Data Center (NCDC) is responsible for the long-term preservation and management of all Level 1 and most high-level POES data sets. The National Oceanographic Data Center (NODC) is responsible for the long-term preservation and management of selected Level 2 Oceanographic data sets. The SAA is a CEMSCS component that provides on-line storage and user access to Level 1 and selected Level 2 data sets.

Communication services are provided across the ground segment to link PGS operational sites with each other, and with its community of national and international users.

The PGS will use the existing ground segment baseline to support the IJPS with numerous hardware and software system upgrades/modifications to ground segment elements.

2.3 PGS Elements Overview

The PGS is divided into six primary functional elements for the purpose of allocating requirements in this document. They are:

- Command & data acquisition element, located at the Fairbanks, Alaska, and Wallops, Virginia, stations
- Satellite operations, control and health & safety monitoring element located at the SOCC in Suitland, Maryland
- Data ingest and preprocessing (Level 1 product) element located at the CEMSCS in Suitland, Maryland
- Product generation and distribution (Levels 2 & 3 products) element located at the OSDPD in Suitland
- Long term data archive and access elements are located at NCDC, Asheville, N.C., NODC, Silver Spring, Md., and at SAA in Suitland, Md.
- The Communications (COMM) element provides the communications network infrastructure and connections between the Suitland interface and the Darmstadt interface, and among the PGS elements.

2.4 PGS Interfaces

The PGS interfaces with entities that are outside the domain of the POES system, but which are required to provide the full mission functions and fulfill mission objectives. These interfaces provide information to the POES System and/or receive information from the POES System, and include the following:

- The EUMETSAT Core Ground Segment (CGS)
- User Communications
- Global Positioning System (GPS)
- Air Force Satellite Control Network (AFSCN)
- NASA
- NWS
- Direct Broadcast Users
- Department of Defense (DOD) Users

3 POES System Requirements for IJPS

This section presents the formal set of new/additional requirements levied on the NOAA POES System to support the IJPS. Existing requirements in place for the current operational POES System shall be continued in the IJPS period without any interruption. Based on that assumption, NOAA/NESDIS will continue supporting the NOAA-N and -N' satellites in an identical manner in all operational aspects to the prior generation of NOAA afternoon satellites.

The new requirements introduced by this document represent additions and/or modification to the existing POES System requirements due to NOAA participation in the IJPS operation and services. New requirements include providing mutual cross-support capability for satellite commanding and data acquisition, and acquiring global data from satellites that are not in view of their respective CDA station. Each satellite provides continuous direct broadcast of real-time environmental data to ground stations and also stores one complete orbit of mission data to be downloaded on command to a dedicated ground station.

The EPS space segment, the Metop satellites include the Metop-1 and -2 satellites. The Metop satellites introduce a number of features not currently supported by the POES Ground Segment. The features include stored global 1 km resolution imagery; use of an X-band downlink for stored instrument data, auxiliary bus data and housekeeping telemetry from the satellite to a ground segment; new High Resolution Picture Transmission (HRPT) and Low Resolution Picture Transmission (LRPT) data formats; use of the Consultative Committee for Space Data Systems (CCSDS) downlink data format; and selective data encryption [AD-3, AD-4, AD-7, RD-3].

In addition to the above changes, all global data received by each ground segment (POES and EPS) will be exchanged in support of the IJPS mission. The PGS will also process global data received from the Metop satellite and distribute products to the NOAA user community [AD-8, RD-4].

Further descriptions of the ground segment baseline configurations and planned PGS element upgrades to support the IJPS are included in the POES Ground Segment Upgrade Description and other documents [RD-1, RD-2, RD-3].

a) Levels of Requirements

Levels are used to manage and control the POES system upgrade process and tasks for the IJPS. Three levels of requirements are defined. They are the System, Segment and Element levels. The System level defines requirements for the POES System including its interfaces to external entities. The Segment Level defines requirements for the Space and Ground segments based on allocation from the system level requirements. The Element Level defines requirements for the six ground segment elements based on allocation from the Ground Segment requirements.

b) Requirement Traceability

Traceability refers to the relationship between requirements (parent-child relationship), and between requirements and their verification method/level. System requirements are allocated to the Segment, and the segment requirements are allocated to the Elements. To facilitate requirement traceability between levels, all requirements have a unique identifier (ID). A Requirement Traceability and Verification Matrix (RTVM) shall be included in all POES requirement documentation. The RTVMs for the requirements stated, at system and segment levels, in this document are presented in Attachments A-1 and A-2.

c) POES Requirement Documentation for IJPS

The POES requirement documentation hierarchy is shown in Figure 3-1. Referring to Figure 3-1, at the Program level, are the Memorandum of Agreement [AD-1], and the Program Implementation Plan (PIP) [AD-2] documents, which are the IJPS source program documents. Shown at the System/Segment level, is this POES System Requirements for IJPS document, which is designated as "RDN-4" in the PIP. All POES System requirements stated in this document are traceable to statements and/or agreements made in either or both of these source documents.

Also shown are the Interface Requirement Documents (IRDs) [AD-3 through AD-6]. Using the POES and EPS system level requirements documents as the source, the IRDs define the NOAA-EUMETSAT interface requirements, and are jointly developed and agreed to by NOAA and EUMETSAT. The IRDs lead to the joint development of Interface Control Documents (ICDs).

The Element Level requirement documentation shown is the responsibility of the pertinent NOAA/NESDIS organization. Each of those functional organizations shall develop their respective requirement documentation, conforming to their existing internal requirement development process/procedures, for implementing their portion of the system upgrades for the IJPS. However, each requirement in those documents shall provide traceability to their corresponding (parent) requirement in Section 3.3.X of this document.

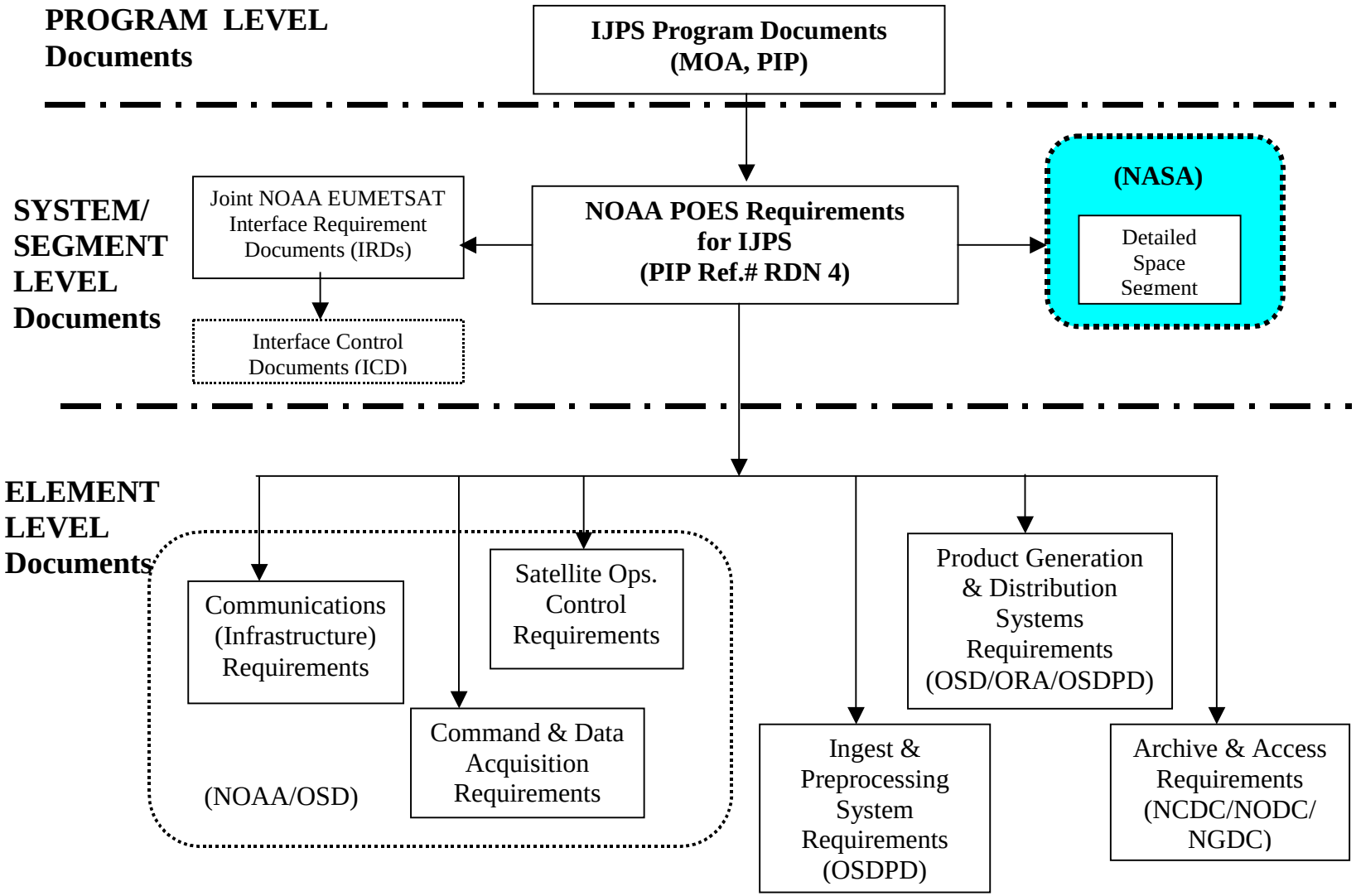

Figure 3-1 NOAA IJPS Requirements Documentation Hierarchy

d) Terminology/definitions referred to in this document

- NOAA-N and -N': Afternoon equatorial crossing satellites, total responsibility of NOAA/NESDIS, essentially continuation of the current POES system with required upgrades for IJPS support.
- Metop-1 and -2: Morning equatorial crossing satellites, total responsibility of EUMETSAT. These satellites replace the NOAA morning satellites in the IJPS period.
- Data Types:
  - i) Metop Global Data - Global Data Stream (GDS), X-band downlink at 70Mbps.
  - ii) NOAA Global Data - GAC data stream, S-band downlink at 2.66Mbps.
- Data Transmission Modes:
  - i) Pipeline: data of one orbit continuously transmitted, processed and distributed within the time of the next orbit.
  - ii) Throughput mode: data are transmitted without any other delay than required for the transmission itself and the data throughput IN equals the data throughput OUT.
- Blind Orbit: Orbit that could not be acquired by the satellite nominal ground station i.e. Fairbanks and Wallops for NOAA and EPS CDA (location Svalbard) for Metop. The reasons for not been able to acquire the data include failure scenarios, non-visibility from the ground station, cross-support for satellite operations upon request for specific operations.
- Split Mission: The acquisition of mission data is split between two similar (POES or Metop) operational satellites; to accommodate for one or more failed instruments on one or the other satellite.
- Cross Support: One agency assisting the other, upon request by either, for specific services.
- Interfaces:
  - i) Suitland Interface - NOAA single point interface at Suitland for EPS to acquire IJPS satellite data and information per mutual agreement.
  - ii) Darmstadt Interface - EPS single point interface at Darmstadt for NOAA to acquire IJPS satellite data and information per mutual agreement.
  - iii) Generic File Transfer (GFT) Interface - Internet type (TBC) of interface between NOAA and EUMETSAT for exchange of auxiliary/ancillary type of data.
- Definitions:
  - i) TBC - to be confirmed: Open issue, exact value/quantity/implementation yet to be decided
  - ii) TBD - to be determined: Open issue, under discussion
  - iii) TBS - to be supplied: Open issue, under analysis
  - iv) TBW - to be written: document under development

- NOAA and EUMETSAT Product Level Definitions:

Processing Level	NOAA	EUMETSAT
0	Reconstructed, unprocessed instrument/payload data at full resolution; with all communication artifacts removed (e.g. synchronization frames, communication headers, duplicate data).	Composed of instrument source packets over time interval (CCSDS packets) appended with auxiliary and ancillary data and associated quality flags. IASI level 0 data are precalibrated spectra and uncalibrated images.
1a	Reconstructed, unprocessed instrument/payload data at full resolution with time-reference quality check.	Instrument reformatted level 0 data with auxiliary and ancillary data. Pixel localization and calibration coefficients are computed. They are appended along with all auxiliary and ancillary data required to compute them (e.g. calibration target counts and orbit parameters). IASI level 1A data are post calibrated spectra and calibrated images.
1b*	Uncompressed Level 1b data that contains appended earth located, time-tagged instrument counts, with ancillary and metadata information, including radiometric and geometric calibration coefficients and geo-referencing parameters (e.g., platform ephemeris, computed and appended but not applied to the Level 0 data). Available for NESDIS internal use only.	N/A
1b	Compressed 1b*, raw instrument data that has been quality controlled, assembled into discrete data sets, and to which Earth location and calibration information has been appended, but not applied.	Radiometrically corrected and calibrated data in physical units at full instrument resolution as acquired. IASI level 1B data are as level 1A but re-sampled to a nominal wavenumber grid.

Processing Level	NOAA	EUMETSAT
1c	NOAA currently does not have Level 1c. In future Level 1c would be 1b* data with physical units on a pixel level plus geometry plus QC flags, earth location and calibration applied.	In the case of IASI apodized data with radiance clusters derived from AVHRR pixels in the IASI FOV. In the case of ATOVS, sounding and/or imager data remapped on a common instrument grid. N/A for ASCAT, GOME-2 and GRAS.
2	Derived geophysical variables at the same or reduced resolution and location as Level 1 source data., hence are orbital products.	Retrieved environmental variables at the same resolution and location as level 1 source data. May also include geophysical products derived by combination of data from various instruments on a single pass basis.
3	Products generated at a reduced spatial and/or temporal resolution.	Gridded point geophysical products on a multi-pass basis.

e) Requirement Identification

Requirements are presented in delineated paragraphs of text, including a requirements header and text paragraphs. Each section has the following requirement categories:

- Functional: What the system must do - "a capability".
  Note: Any applicable performance requirement to this functional requirement should be found under "Performance" in the same section.
- Operational: "When", "where', "how long" etc. what a system does, and may require operator's assistance.
- Interface: Aspects unique to the interface for the system "to interact" with others.
- Performance: "How well" the system must do, in quantifiable units.

The format for requirements identification is as follows:

Requirement Identifier (ID)	**Verification Method**
Text Paragraph	

- The **Requirement ID** is defined as follows:

For **System Requirements**, the requirement ID is in the form:
PSYS, <a.b.c.d.>-<number>", followed by text paragraph(s).
Where,
<**a.b.c.d.**> corresponds to the subsection number in which the requirement is contained.

<**number**> is a sequential number for the requirement.
Verification Method: This defines the selected method of verification for the requirement as per Table 3-1.

Table 3-1 Verification Methods

Verification Method	**Definition**
ANALYSIS	Analysis is an engineering assessment and/or mathematical process that may include computer modeling and/or simulation to determine compliance with specification requirements.
DEMONSTRATION	Demonstration is the determination of properties and performance involving proof-by-doing.
INSPECTION	Inspection is the examination or measurement of product characteristics or the review of design, production or test documentation to determine compliance with specified requirements.
TEST	Test is the exercise of hardware, software, or operations to measure quantitatively specified requirements.
Joint Test (JT)	Joint test is the exercise of hardware, software, or operations that involve both the POES and EPS systems to jointly accomplish the desired objective(s).

3.1 System Requirements

The requirements listed herein are applicable to the POES system in the IJPS period. These requirements introduce new functionality and/or operations to the legacy POES System and its elements for participation in the IJPS.

Requirements pertaining to the areas of Quality Control Standards, Maintainability, Training and Logistics are not specifically mentioned in this document based on the understanding that each POES System element shall adopt their existing practice in these areas.

3.1.1 Functional

PSYS-3.1.1-010 Joint Demo

The POES system shall collect, exchange, and disseminate global environmental data to users for operational meteorological and environmental forecasting and global climate monitoring in support of the IJPS mission. [AD-2, 2.4.1]

PSYS-3.1.1-015 Joint Demo

The POES system shall collect and disseminate local data in real time to users for operational meteorological and environmental forecasting in support of the IJPS mission. [AD-2/3.1]

PSYS-3.1.1-020 Demo/Inspection

The POES system shall be comprised of the following:

- a series of two operational satellites (NOAA-N and -N') flown consecutively in an orbit with an “afternoon” equatorial crossing time (ascending node) [3.1]
- a series of two spacecraft with a set of common (with Metop) instruments (AVHRR, HIRS, AMSU-A, MHS, SEM , SARSAT and A-DCS) [AD-2, 2.5.1, 3.1, 3.2.1] and an additional instrument (SBUV) unique to the POES mission. [AD-2, 3.1]
- at least one Command and Data Acquisition (CDA) station and a geographically separate back-up [AD-2, 3.1]
- at least one Satellite Operations Control Center and a geographically separate back up
- at least one Data Processing, Distribution and Archive Facility [AD-2, 3.1] and
- telecommunications capabilities for command, telemetry and data exchange. [AD-2/3.1, 3.2.1, 3.2.3]

PSYS-3.1.1-030 Demo (NASA)

The POES system global data shall include the NOAA satellite instrument set and spacecraft/instrument state of health. [AD-2/3.1]

PSYS-3.1.1-040 Joint Demo

The Metop global data (GDS) acquired by the POES system from the EPS ground segment shall include the common instrument set and the additional Metop instrument set (Infrared Atmospheric Sounding Interferometer (IASI), Advanced Scatterometer (ASCAT), Global Navigation Satellite System Receiver for Atmospheric Sounding (GRAS), and Global Ozone Monitoring Experiment (GOME-2)), spacecraft/instrument state of health and administrative messages. [AD-2/3.1]

PSYS-3.1.1-050 Joint Test

The POES system shall retrieve from the EPS ground segment the Metop-1 and then Metop-2 satellites global data. [AD-2/3.6.3]

PSYS-3.1.1-060 Joint Demo

The POES system shall provide a throughput mode commanding access and transmit capability to the EPS Metop-1 and then Metop-2 satellites via a PGS CDA station, for cross-support and contingency operations. [AD-2/3.6.1.2]

PSYS-3.1.1-061 Joint Demo

The POES system shall make available to EPS ground segment the Metop telecommand-echo, for cross-support operations, in a real-time throughput mode. [AD-2/3.6.1.2]

PSYS-3.1.1-070 Joint Demo

The POES system shall receive housekeeping telemetry data from the Metop-1 and then Metop-2 satellites while over the PGS CDA station for cross-support operations and make it available to EPS ground segment, in a real-time throughput mode. [AD-2/3.6.1.2]

PSYS-3.1.1-075 Joint Test

The POES system shall acquire real time MHRPT data from the Metop-1 and then Metop-2 satellite while over the PGS CDA station and process/extract the AVHRR instrument and telemetry data, and transfer it to the NOAA IPS element. [NOAA]

PSYS-3.1.1-080 Analysis

The POES system shall be sized to provide blind orbit cross-support to one operational Metop satellite with any additional requests to be accommodated within the sizing of the system. [AD-2/3.6.1.2, 3.6.3]

PSYS-3.1.1-090 Joint Demo

The POES system shall be capable of scheduling, generating and transferring satellite commands to the NOAA-N and then NOAA-N' satellites via the EPS ground segment, in real-time, for NOAA blind orbit cross-support operations. [AD-2, 3.6.1.2]

PSYS-3.1.1-100 Joint Demo

The POES system shall acquire NOAA-N and NOAA-N' real-time housekeeping telemetry data from the EPS ground segment for NOAA blind orbit and cross-support operations. [AD-2, 3.6.1.2]

PSYS-3.1.1-105 Joint Demo

The POES system shall acquire the NOAA-N and -N' teletelecommand-echo made available by the EPS PCDA station in real time, for NOAA blind orbit and cross-support operations. [AD-2, 3.6.1.2]

PSYS-3.1.1-110 Joint Test

The POES system shall make available to the EPS ground segment the global data collected from NOAA-N and then NOAA-N’ satellites, at the PGS CDA stations. [AD-2, 3.6.3]

PSYS-3.1.1-120 Joint Demo

The POES system shall be capable of receiving global data from the Metop-1 and then from Metop-2 satellites while over the PGS CDA station, for EPS blind orbits. [AD-2, 3.6.3, AD-3, 4.2, AD-5]

PSYS-3.1.1-130 Joint Demo

The POES system shall make available to EPS ground segment the global data from Metop-1 and then from the Metop-2 satellites acquired by the PGS CDA station (Virtual Channel Data Units (VCDU), decoded and with the corresponding time stamp and quality flags appended). [AD-2, 3.6.3]

PSYS-3.1.1-140 Joint Demo

The POES system shall retrieve from the EPS ground segment the global data of NOAA-N and then from the NOAA-N' satellites for NOAA blind orbits. [AD-2, 3.6.3]

PSYS-3.1.1-150 Joint Demo

The POES system shall complete the transfer of the global data from orbit N, to the NOAA interface for EPS to retrieve, before starting the acquisition from N+1. [AD-2, 3.6.3]

PSYS-3.1.1-160 Joint Demo

The POES system shall make available to the EPS ground segment (at the Darmstadt Interface) the MHS housekeeping data received from the NOAA satellites. [AD-2, 3.6.1.3]

PSYS-3.1.1-170 Joint Demo

The POES system shall acquire the housekeeping data, for the NOAA provided instruments, from the EPS ground segment, received from the EPS Metop satellites. [AD-2, 3.6.1.3]

PSYS-3.1.1-180 Joint Demo

The POES system shall make available to the EPS all the data necessary to preprocess NOAA satellite instrument data (e.g. satellite ephemeris or orbital-state, on-board time correlation, instrument calibration parameters and updates). [AD-2, 3.1, 3.6.3]

PSYS-3.1.1-190 Joint Demo

The POES system shall acquire from the EPS ground segment all the data necessary to process Metop satellite instrument data (e.g. satellite ephemeris or orbital state, on-board time correlation, instrument calibration parameters and updates). [AD-2, 3.1, 3.6.3]

PSYS-3.1.1-200 Joint Demo

The POES system shall be capable of ingesting and preprocessing the common core instrument data extracted from the Metop global data, to NOAA Level 1 (i.e. sorting of the data, earth location and appending or application of the calibration coefficients, and performance of the associated quality control). [AD-2, 2.5.1; 3.6.4]

PSYS-3.1.1-210 Test

The POES system shall be capable of ingesting and preprocessing the AVHRR instrument and telemetry data extracted (at NOAA CDA station) from Metop HRPT, for NOAA users. [NOAA morning mission req.]

PSYS-3.1.1-220 Demo, Joint Test

The POES system shall receive and process the Metop instrument Level 1 (and Level 2-TBC) data from the EPS ground segment, to meet NOAA user requirements. [AD-2, 3.6.4, DAY 2/Progressive development]

PSYS-3.1.1-230 Demo

The POES system shall distribute all preprocessed global data and products produced by NOAA to the user community. [AD-2, 3.6.4]

PSYS-3.1.1-250 Demo

The POES system shall archive global data and associated databases received from the Metop satellites. [AD-2, 3.6.4]

PSYS-3.1.1-260 Demo

The POES system shall archive all products generated by the PGS from Metop satellite data. [AD-2, 3.6.4]

PSYS-3.1.1-270 Demo

The POES system shall provide for telecommunications capabilities among the PGS elements, to ensure timely and reliable exchange of command, telemetry/housekeeping and global data, and systems information in support of IJPS operations. [AD-1, 3.3.4, AD-2, 3.6.1.2, 3.6.1.3, 3.6.3]

PSYS-3.1.1-275 Joint Demo

The POES system shall provide for telecommunications capabilities between the Suitland interface and the Darmstadt interface, to ensure timely and reliable exchange of command, telemetry/housekeeping and global data, and systems information in support of IJPS operations. [AD-1, 3.3.4, AD-2, 3.6.1.2, 3.6.1.3, 3.6.3]

PSYS-3.1.1-280 Demo

The POES system shall maintain instrument calibration databases for the Metop satellite instruments, to support product generation needs in the IJPS period. [AD-2, 3.6.1, 3.6.4]

3.1.2 Operational

PSYS-3.1.2-010 Analysis

The POES system operational phase for an IJPS satellite shall start upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites. [AD-2, 3.6.1.1]

PSYS-3.1.2-020 Demo (NASA)

The POES system shall control the day-to-day operations, in coordination with the EPS ground segment, anomaly resolution and health/safety of NOAA satellites including all instruments (regardless of the origin) in the IJPS period. [AD-2, 3.6.1.1, 3.6.4]

PSYS-3.1.2-030 Demo

The POES system shall provide for a rolling archive of 7 days of the NOAA-N and N' and Metop global data acquired at the CDA stations. [AD-2, 3.6.3]

PSYS-3.1.2-040 Joint Analysis

The POES system shall develop detailed joint plans and procedures with EPS for supporting nominal, contingency and split-mission scenario operations. [AD-2, 3.6.2]

3.1.3 Interface

PSYS-3.1.3-010 Joint Demo

The POES system shall be capable of interfacing with the EPS space segment as defined in AD-5 (L, S, and X bands). [AD-2, 3.6.1.2, 3.6.3, L-band/TBD]

PSYS-3.1.3-015 Joint Demo

PSYS-3.1.3-020 Joint Demo

The POES system shall be capable of exchanging data with EPS ground segment as established in Article 8 of the IJPS Agreement and as applicable to NOAA. [AD-2, 3.6.3]

PSYS-3.1.3-030 Joint Demo

The POES system shall provide for a NOAA Suitland Interface for data exchange, cross-support operational activities, day-to-day joint tasks coordination, and blind orbit support with the EPS ground segment. [AD-2, 3.6.1.2, 3.6.2]

PSYS-3.1.3-035 Joint Demo

The POES system shall provide for a voice loop exchange for operational coordination with the EPS. [AD-2, 3.6.2]

PSYS-3.1.3-040 Demo

The POES system shall be capable of interfacing with the EPS ground segment (Darmstadt Interface) for NOAA to retrieve/exchange information in support of IJPS operations. [AD-2, 3.6.3]

PSYS-3.1.3-050 Demo

The POES system shall provide an interface for the distribution of the NOAA global data, to the Department of Defense in the IJPS period. [Shared Processing Agreement]

PSYS-3.1.3-060 Demo

The POES system shall provide an interface for the distribution of the common instrument data extracted from Metop global data, to the Department of Defense in the IJPS period. [Shared Processing Agreement]

3.1.4 Performance

PSYS-3.1.4-010 Analysis

The POES system shall be capable of supporting the launch of a new NOAA satellite within 120 days of notification**.** [MOA, 4.1.3]

PSYS-3.1.4-020 Joint Test

The POES system shall make available to the EPS ground segment the data on a mutually agreed basis and meet the processing timeliness, as defined at the Segment and Element levels. [AD-2, 3.6.3]

PSYS-3.1.4-030 Test

The POES system shall complete product processing of the AVHRR instrument and telemetry data (extracted from MHRPT over NOAA CDA) and deliver product to users in less than 30 minutes from observation. [NOAA User]

3.2 Segment Requirements

3.2.1 Space Segment

The requirement structure format is the same as described in Section 3.1, except as noted below.

♦ The **Requirement ID** is defined as follows:

For **Space Segment Satellite Requirements**, the requirement ID is in the form:
PSAT, <a.b.c.d.>-<number>", followed by text paragraph(s).
For **Space Segment Launch Support System Requirements**, the requirement ID is in the form:
PSLV, <a.b.c.d.>-<number>", followed by text paragraph(s).
Where,
<**a.b.c.d.**> corresponds to the subsection number in which the requirement is contained.
<**number**> is a sequential number for the requirement.
Verification Method: This defines the selected method of verification for the requirement as per Table 3-2.

3.2.1.1 Satellite (POES)

3.2.1.1.1 Functional

PSAT-3.2.1.1.1-010 Analysis, Joint Test (NASA)

The POES shall collect, store and transmit global environmental data on command to an IJPS CDA station in support of the IJPS mission. [PSYS-3.1.1-010]

PSAT-3.2.1.1.1-020 Analysis (NASA)

The POES shall provide for two satellites, NOAA-N and NOAA-N', flown consecutively into orbit with an afternoon equatorial crossing time (ascending node). [PSYS-3.1.1-020]

PSAT-3.2.1.1.1-030 Inspection (NASA)

The POES shall be comprised of a common set of on-board instruments (AVHRR, HIRS, AMSU-A, MHS, SEM, SARSAT, DCS) and an SBUV instrument. [PSYS-3.1.1-020]

PSAT-3.2.1.1.1-040 Analysis (NASA)

The POES shall transmit global science data that includes data from the common instrument set and the additional SBUV instrument. [PSYS-3.1.1-030]

PSAT-3.2.1.1.1-050 Analysis (NASA)

The POES shall transmit direct broadcast of high resolution and low-resolution picture transmission. [PSYS-3.1.1-015]

PSAT-3.2.1.1.1-060 NASA LEO Analysis

The POES shall transmit spacecraft housekeeping telemetry to CDA stations. [PSYS-3.1.1-100]

3.2.1.1.2 Operational

PSAT-3.2.1.1.2-010 Analysis

The POES shall have an on-orbit design life as defined in AD-10. [PSYS-3.1.1-020]

3.2.1.1.3 Interface

PSAT-3.2.1.1.3-010 Test

The POES shall conform to space-to-ground interface specifications as defined in AD-6. [PSYS-3.1.1-020]

3.2.1.1.4 Performance

PSAT-3.2.1.1.4-010 Demo

The POES shall conform to the performance characteristics as defined in NASA document, AD-10. [PSYS-3.1.1-020]

3.2.1.2 Launch Support System

3.2.1.2.1 Functional

PSLV-3.2.1.2.1-010 Analysis (NASA)

The launch support system shall provide for all launch vehicle, launch support, training and documentation for placing each POES in it's assigned orbit. [PSYS-3.1.1-020]

PSLV-3.2.1.2.1-020 Analysis (NASA)

The launch support system shall be capable of injecting the POES into the assigned afternoon equatorial crossing ascending node orbit. [PSYS-3.1.1-020]

3.2.1.2.2 Operational

PSLV-3.2.1.2.2-010 Analysis (NASA)

The launch support system shall conform to launch configuration and operational sequence as agreed between the NASA and NOAA POES Program. [PSYS-3.1.1-020]

3.2.1.2.3 Interface

PSLV-3.2.1.2.3-010 Analysis (NASA)

The launch support system shall interface with the POES as defined per NASA document, RD-1. [PSYS-3.1.1-020]

3.2.1.2.4 Performance

PSLV -3.2.1.2.4-010 NASA Analysis

The launch support system shall place POES in the "afternoon equatorial crossing" orbit as defined by NASA and in RD-1. [PSYS-3.1.1-020]

PSLV -3.2.1.2.4-020 NASA Analysis

The launch support system shall be capable of supporting the launch of a new NOAA satellite within 120 days of call-up notification**.** [PSYS-3.1.4-010]

3.2.2 Polar Ground Segment (PGS)

The requirement ID structure format is the same as described in Section 3.1, except as noted below.
For **PGS Level Requirements**, the requirement ID is in the form:
PGSL, <a.b.c.d>-<number>", followed by text paragraph.

3.2.2.1 Functional

PGSL-3.2.2.1-010 Demo

The PGS shall be capable of receiving, processing, exchanging and disseminating global environmental data in support of the IJPS mission. [PSYS-3.1.1-010]

PGSL-3.2.2.1-020 Inspection

The PGS shall include at least one primary and a backup CDA station. [PSYS-3.1.1-020]

PGSL-3.2.2.1-030 Inspection

The PGS shall include at least one primary and a backup SOCC. [PSYS-3.1.1-020]

PGSL-3.2.2.1-040 Inspection

The PGS shall include at least one data processing, distribution and archive facility. [PSYS-3.1.1-020]

PGSL-3.2.2.1-050 Demo

The PGS shall be capable of acquiring from the Darmstadt Interface, the Metop-1 and then Metop-2 satellite global data, made available by EPS. [PSYS-3.1.1-040, PSYS-3.1.1-050]

PGSL-3.2.2.1-060 Demo

The PGS shall be capable of acquiring from the Darmstadt Interface, the NOAA satellite blind orbit global data, made available by EPS. [PSYS-3.1.1-140]

PGSL-3.2.2.1-070 Demo

In the event the global data from NOAA-N or N' satellites is unavailable, the PGS shall be capable of acquiring the Stored AIP (SAIP) or Stored TIP (STIP) data from the Darmstadt Interface. [PSYS-3.1.1-140]

PGSL-3.2.2.1-080 Demo

The PGS shall be capable of receiving, transporting (in throughput mode) and uplinking telecommands to the Metop satellites through the POES CDA station, for Metop blind orbits, in compliance with performance requirements in Sec. 3.2.2.4. [PSYS-3.1.1-060]

PGSL-3.2.2.1-090 Demo

The PGS shall be capable of receiving the global and housekeeping telemetry data from the Metop-1 and then Metop-2 satellite, for EPS cross-support operations, as defined in AD-5. [PSYS-3.1.1-070, PSYS-3.1.1-120, PSYS-3.1.1-130]

PGSL-3.2.2.1-100 Demo

The PGS shall be capable of delivering to the Suitland Interface the global data acquired from the Metop satellites, by the PGS CDA station (Fairbanks) in compliance with performance requirements. [PSYS-3.1.1-070, PSYS-3.1.1-130]

PGSL-3.2.2.1-110 Demo

The PGS shall be capable of delivering to the Suitland Interface the Metop-1 and Metop-2 satellite housekeeping telemetry data in throughput mode, for cross support, and in compliance with performance requirements [PSYS-3.1.1-070]

PGSL-3.2.2.1-115 Demo

The PGS shall receive the MHRPT data in real-time at the PGS CDA stations, as defined in AD-5. [PSYS-3.1.1-075, PSYS-3.1.1-015]

PGSL-3.2.2.1-116 Demo

The PGS shall be capable of extracting and processing the AVHRR instrument and telemetry data from the MHRPT data for NOAA users. [PSYS-3.1.1-075]

PGSL-3.2.2.1-120 Demo

The PGS shall be sized to provide blind orbit cross-support to one operational EPS satellite with any additional requests to be accommodated within the sizing of the system. [PSYS-3.1.1-080]

PGSL-3.2.2.1-130 Demo

The PGS shall be capable of scheduling, generating and delivering telecommands to the Darmstadt Interface, for transfer in real time to NOAA satellites by EPS ground segment, for NOAA blind orbit cross-support operations. [PSYS-3.1.1-090]

PGSL-3.2.2.1-140 Demo

The PGS shall be capable of acquiring NOAA satellite telecommand-echo, from the Darmstadt Interface, for NOAA blind orbits. [PSYS-3.1.1-105]

PGSL-3.2.2.1-141 Demo

The PGS shall be capable of acquiring NOAA satellite housekeeping telemetry in real time, from the Darmstadt Interface, for NOAA blind orbits. [PSYS-3.1.1-100]

PGSL-3.2.2.1-145 Demo

The PGS shall be capable of generating and transferring to the Suitland Interface, the Metop telecommand echo, in a throughput mode, for cross-support operations. [PSYS-3.1.1-061]

PGSL-3.2.2.1-150 Demo

The PGS shall be capable of delivering to the Suitland Interface the NOAA-N and then -N' global data at the raw data level, acquired by the PGS CDA stations, in compliance with performance requirements. [PSYS-3.1.1-110]

PGSL-3.2.2.1-160 Analysis

The PGS shall be capable of delivering to the Suitland Interface the NOAA-N and then -N' split-mission global or SAIP or STIP data received at the PGS CDA stations per any of the combinations below. [PSYS-3.1.1-110]
(a) 2 orbits of GAC

(b) 1 orbit GAC and 1 orbit of SAIP
(c) 1 orbit GAC and 1 orbit of STIP
(d) 2 orbits SAIP
(e) 1 orbit SAIP and 1 orbit of STIP
(f) 2 orbits STIP

PGSL-3.2.2.1-170 Demo

The PGS shall be capable of delivering to the Darmstadt Interface, the MHS telemetry data extracted from NOAA satellites global data, via the Communication element, in compliance with performance requirements. [PSYS-3.1.1-160]

PGSL-3.2.2.1-180 Demo

The PGS shall be capable of acquiring, processing and displaying the NOAA instrument telemetry/housekeeping data from the Darmstadt Interface, received from Metop satellites. [PSYS-3.1.1-170]

PGSL-3.2.2.1-190 Demo

The PGS shall complete the delivery of the Metop global data to the Suitland interface from orbit N before starting the acquisition from orbit N+1, in compliance with performance requirements. [PSYS-3.1.1-150]

PGSL-3.2.2.1-200 Demo

The PGS shall be capable of delivering to the Darmstadt Interface via a GFT protocol the data needed to preprocess NOAA satellite instrument data (e.g. satellite ephemeris or orbital-state, on-board time correlation, instrument calibration parameters). [PSYS-3.1.1-180]

PGSL-3.2.2.1-210 Demo

The PGS shall be capable of acquiring from the EPS, via a GFT protocol, the data necessary to preprocess Metop satellite instrument data (e.g. satellite ephemeris or orbital state, on-board time correlation, instrument calibration parameters). [PSYS-3.1.1-190]

PGSL-3.2.2.1-220 Demo

The PGS shall be capable of ingesting and preprocessing, at full resolution, the common core instrument data extracted from the Metop global data, to NOAA Level 1 data sets. [PSYS-3.1.1-200]

PGSL-3.2.2.1-221 Demo

The PGS shall be capable of ingesting and preprocessing the NOAA satellite blind orbit global data acquired from the Darmstadt Interface. [PSYS-3.1.1-140]

PGSL-3.2.2.1-222 Demo

The PGS shall be capable of ingesting and preprocessing to NOAA Level 1 data set the MHS instrument data from the NOAA satellites global data. [PSYS-3.1.1-220]

PGSL-3.2.2.1-230 Demo

The PGS shall be capable of generating Level 2 and 3 products from the common core instrument data extracted from the Metop global data. [PSYS-3.1.1-220]

PGSL-3.2.2.1-235 Demo

The PGS shall be capable of generating Level 2 and 3 products from the MHS instrument data from the NOAA satellites global data. [PSYS-3.1.1-220]

PGSL-3.2.2.1-240 Demo

The PGS shall be capable of ingesting and preprocessing to NOAA Level 1 data set the AVHRR instrument and telemetry data extracted from MHRPT data, received by the NOAA CDA stations. [PSYS-3.1.1-210]

PGSL-3.2.2.1-245 Demo

The PGS shall be capable of generating Level 2 and 3 products for the AVHRR instrument and telemetry data extracted from MHRPT data. [PSYS-3.1.1-210]

PGSL-3.2.2.1-250 Demo

The PGS shall be capable of ingesting (and preprocessing) in pipeline mode, the Metop instrument Level 1 and Level 2 products, acquired from EPS, to meet NOAA user requirements. [**TBD,** PSYS-3.1.1-220, DAY 2/Progressive development]

PGSL-3.2.2.1-260 Demo

The PGS shall be capable of generating Level 2 and 3 products from the Metop Level 1 products received from EPS, to meet NOAA user requirements. [**TBD**, PSYS-3.1.1-220, DAY 2/Progressive development]

PGSL-3.2.2.1-270 Demo

The PGS shall be capable of generating Level 2 and 3 products from the Metop Level 2 products received from EPS, to meet NOAA user requirements. [**TBD,** PSYS-3.1.1-220, DAY 2/Progressive development]

PGSL-3.2.2.1-280 Demo

The PGS shall make available to users, the NOAA Level 1b data sets generated from the Metop satellite global data. [PSYS-3.1.1-230, DAY 2/Progressive development]

PGSL-3.2.2.1-290 Demo

The PGS shall be capable of distributing all NOAA Level 2 and 3 products produced by the PGS, from the Metop satellite global data, to users [PSYS-3.1.1-230, DAY 2/Progressive development]

PGSL-3.2.2.1-300 Demo

The PGS shall archive global data and associated databases from the Metop satellite. [PSYS-3.1.1-250]

PGSL-3.2.2.1-310 Demo

The PGS shall archive all auxiliary, ancillary and metadata for Metop global data. [PSYS-3.1.1-250]

PGSL-3.2.2.1-320 Demo

The PGS shall archive all Levels 2 and 3 products generated by the PGS from the common core instruments data on the Metop satellite. [PSYS-3.1.1-260]

PGSL-3.2.2.1-330 Demo

The PGS shall archive all Levels 2 and 3 products generated by the PGS from the Metop instruments data on Metop satellite. [PSYS-3.1.1-260 NOAA Day 2/Progressive development]

PGSL-3.2.2.1-340 Demo

The PGS shall provide for telecommunications capabilities among the PGS elements to exchange satellite data and information, reliably and in a timely manner as defined by each of the interconnecting element. [PSYS-3.1.1-020, PSYS-3.1.1-270]

PGSL-3.2.2.1-350 Demo

The PGS shall provide for telecommunications capabilities between the Suitland and Darmstadt Interfaces, for acquiring from Darmstadt the following data types. [PSYS-3.1.1-020, PSYS-3.1.1-275]
(a) NOAA GAC/SAIP/STIP in pipeline mode
(b) Metop global data in pipeline mode
(c) NOAA TIP/AIP/HRPT in throughput mode
(d) NOAA TC Echo in throughput mode

PGSL-3.2.2.1-360 Demo

The PGS shall provide for telecommunications capabilities between the Suitland and Darmstadt Interfaces, for transporting to Darmstadt the following data types. [PSYS-3.1.1-020, PSYS-3.1.1-275]
(a) NOAA satellite telecommands for NOAA blind orbits and contingency operations in throughput mode
(b) MHS instrument and telemetry data

PGSL-3.2.2.1-370 Demo

The PGS shall provide telecommunications capabilities among the PGS elements and maintain existing external interfaces including DOD in the IJPS period. [PSYS-3.1.1-020/ PSYS-3.1.1-270]

PGSL-3.2.2.1-380 Demo

The PGS shall provide instrument calibration databases for both the NOAA and Metop satellites to support product generation needs in the IJPS period. [PSYS-3.1.1-280]

PGSL-3.2.2.1-390 Demo

The PGS shall integrate into the PGS any unique EUMESAT-provided equipment required to perform commanding, telemetry acquisition, or data handling for the Metop satellites. [PSYS-3.1.3-010]

PGSL-3.2.2.1-400 Demo

The PGS shall be capable of recording, playing back, and transferring to the Suitland Interface the NOAA satellite STIP, SAIP, and GAC data. [PSYS-3.1.1-110]

PGSL-3.2.2.1-410 Demo

The PGS shall be capable of recording, playing back, and transferring to the Suitland Interface the GDS data received from Metop satellites. [PSYS-3.1.1-130]

3.2.2.2 Operational

PGSL-3.2.2.2-010 Demo

The PGS shall be capable of supporting IJPS operations upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites. [PSYS-3.1.2-010]

PGSL-3.2.2.2-020 Demo

The PGS shall provide for a rolling archive of 7 days for the NOAA-N and -N' and Metop global data acquired at the CDA stations. [PSYS-3.1.2-030]

PGSL-3.2.2.2-030 Demo

The PGS shall conduct day-to-day operations of NOAA satellites in coordination with the EPS ground segment and support joint tasks, including the cross-support and blind orbit support tasks. [PSYS-3.1.2-020]

PGSL-3.2.2.2-040 Demo

The PGS shall provide for Metop telecommand and telemetry data transporting operations, in a throughput mode, for cross-support of operations in compliance with performance requirements as per 3.2.2.4. [PSYS-3.1.1-275]

PGSL-3.2.2.2-050 Demo

The PGS shall transfer NOAA satellite telecommands to the Darmstadt Interface for NOAA blind orbits. [PSYS-3.1.1-270]

PGSL-3.2.2.2-060 Demo

In the event of data acquisition failure by EPS, the PGS shall make available the backlog GAC or SAIP or STIP data at the Suitland Interface or on tapes, as requested by the EPS ground segment. [PSYS-3.1.1-270]

PGSL-3.2.2.2-070 Demo

In the event of data acquisition failure by EPS, the PGS shall make available the backlog GDS data at the Suitland Interface or on tapes, as requested by the EPS ground segment. [PSYS-3.1.2-040]

PGSL-3.2.2.2-080 Analysis

The PGS shall develop detailed joint plans and procedures with EPS for supporting nominal, contingency and split-mission scenario operations. [PSYS-3.1.2-040]

3.2.2.3 Interface

PGSL-3.2.2.3-010 Demo

The PGS shall be capable of interfacing with the EPS Metop satellites for telemetry and data (downlink) and telecommand (uplink), as defined in AD-5. [PSYS-3.1.3-010]

PGSL-3.2.2.3-020 Demo

The PGS shall provide for a single point Interface at Suitland, known as the Suitland Interface, in support of data exchange, cross support activities and telecommand operations in compliance with performance requirements in Section 3.2.2.4. [PSYS-3.1.3-030]

PGSL-3.2.2.3-021 Demo

The PGS shall exchange auxiliary and co-ordination data with the EPS ground segment via a "Generic File Transfer (GFT)" protocol. [PSYS-3.1.1-180/ PSYS-3.1.1-270]

PGSL-3.2.2.3-025 Demo

The PGS shall provide a voice loop for exchange of operational coordination with the EPS ground segment. [PSYS-3.1.3-035]

PGSL-3.2.2.3-030 Demo

The PGS shall make available to EPS ground segment at the Suitland Interface, the following data types, in compliance with the performance requirements. [PSYS-3.1.3-030]

a) NOAA GAC data from NOAA-N and -N' acquired by the NOAA CDA station. (If GAC is unavailable, then Stored AIP (SAIP) or Stored TIP (STIP) data.) In case of communications failure between NOAA and EPS ground segment, PGS shall provide the backlog GAC or SAIP or STIP data on a tape (Standard TBD).
b) Metop GDS data acquired by the NOAA CDA station for EPS blind orbits. In case of communications failure between NOAA and EPS ground segment, PGS shall provide the backlog data on a tape (CLT Tape).
c) Metop telemetry data acquired by the NOAA CDA station for EPS blind orbits.
d) NOAA satellite and instruments auxiliary and coordination data.
e) Metop telecommand echo upon successful transmission of the EPS generated satellite command, by the PGS CDA station.

PGSL-3.2.2.3-035 Demo

The PGS shall provide a data buffering capacity at the Suitland Interface, for data acquired from Fairbanks CDA, to contain a minimum of one complete download of NOAA GAC or SAIP or STIP and one complete download of GDS data, at all times. [PSYS-3.1.3-030]

PGSL-3.2.2.3-040 Demo

The PGS shall be capable of receiving at the Suitland Interface the Metop telecommand data delivered by EPS ground segment, and transfer it to the Fairbanks CDA station in compliance with performance requirements. [PSYS-3.1.3-030]

PGSL-3.2.2.3-050 Demo

The PGS shall be operationally compatible to exchange data/information with the Darmstadt Interface at the EPS ground segment. [PSYS-3.1.3-040]

PGSL-3.2.2.3-060 Demo

The PGS shall acquire from the Darmstadt Interface the following data types, made available by the EPS ground segment. [PSYS-3.1.3-040]

a) NOAA GAC data from NOAA-N and -N' received by the EPS PCDA station for NOAA blind orbits. (If GAC is unavailable, then Stored AIP (SAIP) or Stored TIP (STIP) data.) In case of communications failure between NOAA and EPS ground segment, the backlog GAC or SAIP or STIP shall be received on a tape (Standard TBD).
b) Metop GDS data acquired by the EPS PCDA station. In case of communications failure between NOAA and EPS ground segment, the backlog data shall be received on a tape (Standard TBD).
c) NOAA TIP/AIP/HRPT real-time data acquired by the EPS PCDA station for NOAA blind orbits.
d) Metop satellite and instruments auxiliary and coordination data as defined in Ad-4.
e) NOAA telecommand echo upon successful transmission of the NOAA generated satellite command, by the EPS CDA station.

PGSL-3.2.2.3-065 Demo

The PGS shall provide a data buffering capacity, for data acquired from Darmstadt Interface, to contain a minimum of one complete download of NOAA GAC or SAIP or STIP data and one complete download of GDS data, at all times. [PSYS-3.1.3-030]

PGSL-3.2.2.3-070 Demo

The PGS shall be capable of delivering to the Darmstadt Interface the telecommand for uplink to NOAA satellite through the EPS PCDA station, in compliance with performance requirements. [PSYS-3.1.3-040]

PGSL-3.2.2.3-080 Demo

The PGS shall interface with the EPS External Information Service (EEIS) for the reception of decryption keys for Metop LRPT/HRPT. [PSYS-3.1.3-020, PSYS-3.1.3-040]

PGSL-3.2.2.3-090 Demo

The PGS shall provide/maintain an interface for NOAA user community to access and retrieve short-term and long-term stored/archived data/products from both NOAA and Metop satellites in the IJPS period. [PSYS-3.1.3-050]

PGSL-3.2.2.3-100 Demo

The PGS shall provide/maintain an interface for the distribution of the NOAA global data, to the Department of Defense in the IJPS period. [PSYS-3.1.3-050]

PGSL-3.2.2.3-110 Demo

The PGS shall provide/maintain an interface for the distribution of the common core instrument data extracted from Metop global data, to the Department of Defense in the IJPS period. [PSYS-3.1.3-060]

PGSL-3.2.2.3-120 Demo

The PGS shall be capable of interfacing with any unique EPS provided equipment required for performing commanding, telemetry acquisition or data handling for Metop satellites. [PSYS-3.1.3-010]

3.2.2.4-Performance

PGSL-3.2.2.4-010 Analysis

The PGS shall be capable of supporting the launch of a new POES within 120 days of notification. [PSYS-3.1.4-010]

PGSL-3.2.2.4-020 Analysis

The PGS shall provide for an overall system availability of at least 97.5% calculated on an annualized basis. [PSYS-3.1.4-020]

PGSL-3.2.2.4-030 Test

The PGS shall provide the NOAA GAC or SAIP or STIP data at the Suitland Interface as defined below: [PSYS-3.1.4-020]
(a) In a time ordered manner (first data in transmitted first)
(b) As received with out any processing
(c) First data no later than 2 minutes after loss of signal
(d) Last data no later than 100 minutes after download completion
(e) Data transmitted in a pipeline mode
(f) Data format at the interface shall comply with those defined for NOAA KLMN and N' as applicable.

PGSL-3.2.2.4-040 Test

The PGS shall provide the Metop blind orbit global data at the Suitland Interface as defined below: [PSYS-3.1.4-020]
(a) In a time ordered manner (first data in transmitted first)
(b) Reed-Solomon error decoded and quality flag appended
(c) Data in the VCDU format
(d) UTC time stamp appended
(e) First data no later than 2 minutes after download completion
(f) Last data no later than 100 minutes after download completion
(g) Data available in a pipeline mode

PGSL-3.2.2.4-050 Analysis

The PGS shall deliver 98.8% the NOAA GAC or SAIP or STIP data acquired to the Suitland Interface, measured over any 30 day period. [PSYS-3.1.4-020]

PGSL-3.2.2.4-060 Analysis

The PGS shall deliver 98.8% the Metop global data acquired to the Suitland Interface, measured over any 30-day period. [PSYS-3.1.4-020]

PGSL-3.2.2.4-070 Test

The PGS shall deliver the Metop blind orbit telemetry (TM) data to the Suitland Interface as defined below: [PSYS-3.1.4-020]
(a) Data available in a throughput mode
(b) UTC time stamp appended, with accuracy better than 100 micro-sec. (TBC) and format to conform to the EPS Product Conventions Document [EPS/SYS/TEN/990007]
(c) NOAA shall not alter the content of the TM frames

(d) Ensure that 98.8% of TM Downlink successfully transferred over a 30 day period
(e) The delay between the TM Frame complete acquisition and its availability at the interface shall be less than 1 second
(f) Maximum downtime of the TM transport chain between the CDA station and the interface shall not exceed 100 minutes
(g) Format conform to the layers defined by the Metop Space to Ground Interface document, allows FOP-1 by EPS CGS, and identify originating satellite
(h) Interface shall comply with EPS CGS common TM/TC interface standard (TBD)

PGSL-3.2.2.4-080 Analysis

The PGS shall not exceed a 360 minutes maximum downtime limit for the NOAA CDA station to the Suitland Interface data delivery chain. [PSYS-3.1.4-020]

PGSL-3.2.2.4-090 Analysis, Test

The PGS maximum command transport chain downtime from the Suitland Interface to the CDA station shall not exceed 100 minutes. [PSYS-3.1.4-020]

PGSL-3.2.2.4-100 Demo

The PGS shall be capable of delivering to the Darmstadt Interface, the MHS telemetry data extracted from NOAA satellites global data, via the communication element as defined below. [PSYS-3.1.4-020]
(a) Transfer in throughput mode
(b) Data format as extracted from the satellite data

PGSL-3.2.2.4-110 Analysis

The PGS shall complete product processing of the AVHRR instrument and telemetry data (extracted from MHRPT over NOAA CDA) and deliver product to users in less than 30 minutes from observation. [PSYS-3.1.4-030]

3.3 PGS Element Requirements

The requirement ID structure format is the same as described in Section 3, except as noted below.
For **CDA Element Requirements**, the requirement ID is in the form:
PCDA, <a.b.c.d.>-<number>", followed by text paragraph(s).
For **Satellite Operation Control Element Requirements**, the requirement ID is in the form:
PSOC, <a.b.c.d.>-<number>", followed by text paragraph(s).
For **Ingest and Preprocessing System Element Requirements**, the requirement ID is in the form: PIPS, <a.b.c.d.>-<number>", followed by text paragraph(s).
For **Product Generation & Distribution Systems Element Requirements**, the requirement ID is in the form: PPGD, <a.b.c.d.>-<number>", followed by text paragraph(s).
For **Data Access & Archive System Element Requirements**, the requirement ID is in the form:
PDAA, <a.b.c.d.>-<number>", followed by text paragraph(s).
For **Communications Element Requirements**, the requirement ID is in the form:
PCOM, <a.b.c.d.>-<number>", followed by text paragraph(s).

3.3.1 Command and Data Acquisition Element Requirements

3.3.1.1 Functional

PCDA-3.3.1.1-010 Inspection

The CDA shall include one primary (Fairbanks) and at least one other physically separate back up CDA station. [PGSL-3.2.2.1-020]

PCDA-3.3.1.1-020 Demo

The Fairbanks CDA shall be capable of receiving Metop satellite global and telemetry data in support of the IJPS mission as scheduled by the SOCC and as defined in AD-5. [PGSL-3.2.2.1-010, PGSL-3.2.2.1-090, PGSL-3.2.2.1-110, PGSL-3.2.2.1-115, PGSL-3.2.2.1-170]

PCDA-3.3.1.1-025 Demo

Each CDA shall be capable of receiving the Metop satellite MHRPT data in real time as scheduled by the SOCC and as defined in AD-5. [PGSL-3.2.2.1-115, PGSL-3.2.2.4-110]

PCDA-3.3.1.1-030 Demo

Each CDA shall be capable of processing/extracting and then transferring, the AVHRR instrument and satellite housekeeping VCDUs from the MHRPT, to the IPS element via the communication element, as scheduled by the SOCC. [PGSL-3.2.2.1-116, PGSL-3.2.2.1-040, PGSL-3.2.2.4-110]

PCDA-3.3.1.1-040 Demo

The Fairbanks CDA shall be capable of receiving Metop telecommand data in a throughput mode, via the communications element, from the Suitland Interface. [PGSL-3.2.2.1-080]

PCDA-3.3.1.1-050 Demo

As scheduled by the SOCC and defined in AD-5 the Fairbanks CDA shall be capable of transmitting "uplink" commands to the EPS Metop satellites without any alterations of the content and in compliance with the performance requirement (Sec. 3.3.1.4). [PGSL-3.2.2.1-080]

PCDA-3.3.1.1-060 Demo

The Fairbanks CDA shall process (error decode and time stamp) the EPS Metop satellite global data. [PGSL-3.2.2.1-100, PGSL-3.2.2.4-040]

PCDA-3.3.1.1-070 Demo

The Fairbanks CDA shall process (error decode and time stamp) the EPS Metop satellite housekeeping telemetry data. [PGSL-3.2.2.1-100]

PCDA-3.3.1.1-080 Analysis

The Fairbanks CDA shall be capable of providing blind orbit cross-support to one operational EPS satellite. Additional requests shall be accommodated within the sizing of the system. [PGSL-3.2.2.1-120]

PCDA-3.3.1.1-090 Demo

For cross-support operations the Fairbanks CDA shall be capable of generating and transferring the Metop telecommand echo, in throughput mode, to the Suitland Interface via the Communication element. [PGSL-3.2.2.1-145]

PCDA-3.3.1.1-100 Demo

In the event of failure at the Suitland Interface, the CDA shall make available the GAC or SAIP or STIP backlog data on tapes to EPS. [PGSL-3.2.2.1-150]

PCDA-3.3.1.1-110 Analysis

As scheduled by SOCC the CDA shall be capable of supporting the NOAA-N & then -N' split-mission global or SAIP or STIP data acquisition and transferring it to the Suitland Interface, and the CDA shall support any of the combinations below. [PGSL-3.2.2.1-160]
(a) 2 orbits of GAC
(b) 1 orbit GAC and 1 orbit of SAIP
(c) 1 orbit GAC and 1 orbit of STIP
(d) 2 orbits SAIP
(e) 1 orbit SAIP and 1 orbit of STIP
(f) 2 orbits STIP

PCDA-3.3.1.1-120 Demo

The Fairbanks CDA shall be capable of transferring the global data from EPS Metop-1 and then Metop-2 satellites for orbit N to the Suitland interface, via the communication element, before the CDA station starts acquisition of data from orbit N+1. [PGSL-3.2.2.1-190]

PCDA-3.3.1.1-130 Demo

The Fairbanks CDA shall be capable of recording, playing back and transferring to the Suitland Interface, the NOAA satellite STIP, SAIP, and GAC data, via the Communication element in compliance with performance requirement. [PGSL-3.2.2.1-400]

PCDA-3.3.1.1-140 Demo

The Fairbanks CDA shall be capable of recording, playing back and transferring to the Suitland Interface, via the Communication element, the GDS data received from Metop satellites in compliance with performance requirement. [PGSL-3.2.2.1-410]

PCDA-3.3.1.1-150 Demo

The CDA shall integrate any EUMETSAT-provided unique equipment required to perform commanding, telemetry acquisition and/or data handling for the Metop satellites, for cross support operations. [PGSL-3.2.2.1-390]

3.3.1.2 Operational

PCDA-3.3.1.2-010 Demo

The CDA shall be capable of supporting IJPS operations upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites. [PGSL-3.2.2.2-010]

PCDA-3.3.1.2-020 Demo

The Fairbanks CDA shall be capable of executing day to day operations with EPS Metop-1 and Metop-2 satellites, including cross-support and blind orbit support tasks, as scheduled by SOCC. [PGSL-3.2.2.2-030]

PCDA-3.3.1.2-030 Demo

In the event of data acquisition failure at the Suitland Interface, the CDA shall make available the backlog GAC or SAIP or STIP data at the Suitland Interface or on tapes, as requested and scheduled by SOCC. [PGSL-3.2.2.2-060]

PCDA-3.3.1.2-040 Demo

In the event of data acquisition failure at the interface, the CDA shall make available the backlog GDS data at the Suitland Interface or on tapes, as requested and scheduled by SOCC. [PGSL-3.2.2.2-070]

3.3.1.3 Interface

PCDA-3.3.1.3-010 Demo

The CDA shall interface with the EPS Metop-1 and then Metop-2 satellites for uplink and downlink communications as defined in AD-5. [PGSL-3.2.2.3-010]

PCDA-3.3.1.3-020 Demo

The Fairbanks CDA shall be capable of integrating and interfacing with unique EUMETSAT provided equipment required for performing commanding, telemetry acquisition or data handling for Metop satellites. [PGSL-3.2.2.3-120]

PCDA-3.3.1.3-030 Demo

The CDA shall be capable of interfacing with the Communication element for transferring and receiving data and information, to and from, other PGS elements. [PGSL-3.2.2.3-010]

PCDA-3.3.1.3-040 Demo

The Fairbanks CDA shall transfer to the Suitland interface, via the Communications element, the following data types, in compliance with performance requirements (Sec.3.3.1.4). [PGSL-3.2.2.3-030]

a) NOAA-N and -N' GAC or SAIP or STIP for each orbit.
b) Metop global data acquired for EPS blind orbits.
c) Metop satellite housekeeping telemetry data acquired for EPS blind orbits.

3.3.1.4 Performance

PCDA-3.3.1.4-010 Demo

The CDA shall be capable of supporting the launch of a new POES within 120 days of notification. [PGSL-3.2.2.4-010]

PCDA-3.3.1.4-020 Demo

Each CDA station shall provide the capability for a seven (7) day rolling archive of the global data from both NOAA and Metop satellites, acquired at that station. [PGSL-3.2.2.1-300, PGSL-3.2.2.2-020]

PCDA-3.3.1.4-030 Analysis

The CDA availability, for any single satellite data downlink, shall be 99.4% over any 30-day period. [PGSL-3.2.2.4-020]

PCDA-3.3.1.4-040 Analysis

The CDA data availability for any satellite uplink data type shall be 99.6% over any 30-day period. [PGSL-3.2.2.4-030, PGSL-3.2.2.4-050]

PCDA-3.3.1.4-050 Analysis

The CDA maximum downtime for GAC or GDS data shall never exceed 360 minutes. [PGSL-3.2.2.4-080]

PCDA-3.3.1.4-060 Demo

The CDA maximum downtime for Metop telecommand data shall never exceed 100 minutes. [PGSL-3.2.2.4-090]

PCDA-3.3.1.4-070 Test

The CDA shall transfer the Metop blind orbit telemetry (TM) data to the Suitland Interface, via the communications link, as defined below: [PGSL-3.2.2.4-070, PGSL-3.2.2.4-060]

(a) Data available in a throughput mode
(b) UTC time stamp appended, with accuracy better than 100 micro-secs. (TBC) and format to conform to the EPS Product Conventions Document [EPS/SYS/TEN/990007]
(c) NOAA shall not alter the content of the TM frames
(d) Ensure that 98.8% of TM Downlink successfully transferred over a 30 day period
(e) The delay between the TM Frame complete acquisition and its availability at the CDA communication interface shall be less than 350 millisecond

(f) Maximum downtime of the TM transport chain between the CDA station and the Suitland Interface shall not exceed 100 minutes
(g) Format conform to the layers defined by the Metop Space to Ground Interface document, allows FOP-1 by EPS CGS, and identify originating satellite
(h) Suitland Interface shall comply with EPS CGS common TM/TC interface standard (TBD)

PCDA-3.3.1.4-080 Test

The Fairbanks CDA shall transfer to the Suitland Interface the global data acquired from Metop satellites, via the communication element per criteria below. [PGSL-3.2.2.1-100, PGSL-3.2.2.1-110, PGSL-3.3.1.4-060]
(a) In the Virtual Channel Data Unit format (VCDU)
(b) Reed-Solomon error decoded and quality flags appended
(c) UTC time stamp appended, with accuracy better than 100 micro-secs. (TBC) and format to conform to the EPS Product Conventions Document [EPS/SYS/TEN/990007]
(d) Data made available at the Suitland Interface, should be compatible for acquiring by EPS ground segment in pipeline mode
(e) Last Metop GDS shall be made available at the Suitland Interface not later than 100 minutes after data downlink completion.
(f) The first GDS shall be made available at the Suitland Interface not later than 2 minutes after the completion of the data downlink.
(g) Ensure that 98.8% of GDS data acquired is successfully transferred to the Suitland Interface in a 30 day period

PCDA-3.3.1.4-090 Test

Each CDA shall transfer to the Suitland Interface the NOAA GAC or SAIP or STIP data acquired from the NOAA satellites, via the communication element per criteria below. [PGSL-3.2.2.4-030, PGSL-3.2.2.4-050]
(a) In the time ordered manner (data sensed first shall be transferred first)
(b) Without any modification (no time stamp or quality indicator)
(c) Data made available at interface, should be compatible for acquiring by EPS ground segment in pipeline mode
(d) The last GAC or SAIP or STIP data shall be made available at the Suitland Interface not later than 100 minutes after data downlink completion.
(e) The first GAC or SAIP or STIP data shall be made available at the Suitland Interface not later than 2 minutes after the completion of the data downlink.
(f) Ensure that 98.8% of GDS data acquired is successfully transferred to the Suitland Interface in a 30 day period

PCDA-3.3.1.4-100 Demo

The delay between a complete Metop TC reception at the Suitland Interface and its Uplink/transmission at the Fairbanks CDA station shall be less than 1 second. [PGSL-3.2.2.1-080, PGSL-3.2.2.3-040]

3.3.2 Satellite Control and Operations (SOCC) Element Requirements

3.3.2.1 Functional

PSOC-3.3.2.1-010 Demo

The SOCC shall be capable of scheduling and controlling the overall PGS communications routing functions in support of receiving, processing, exchanging data/information, and recording of satellite data and telemetry in support of the IJPS mission. [PGSL-3.2.2.1-010, PGSL-3.2.2.1-100, PGSL-3.2.2.1-115, PGSL-3.2.2.1-116, PGSL-3.2.2.1-170]

PSOC-3.3.2.1-020 Demo

The SOCC shall be capable of scheduling and controlling the PGS communications routing functions in support of transferring the NOAA satellite telecommands to the Darmstadt Interface. [, PGSL-3.2.2.1-080, PGSL-3.2.2.1-130, PGSL-3.2.2.1-145]

PSOC-3.3.2.1-025 Inspection

In the event, the SOCC is unavailable to support the IJPS mission, corresponding SOCC functions shall be supported at a physically separate backup satellite control center. [PGSL-3.2.2.1-030]

PSOC-3.3.2.1-030 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of acquiring Metop global data and information, via the communication element, from the Darmstadt Interface. [PGSL-3.2.2.1-040, PGSL-3.2.2.1-050]

PSOC-3.3.2.1-040 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of acquiring and transferring the NOAA blind orbit global data from the Darmstadt Interface. [PGSL-3.2.2.1-040, PGSL-3.2.2.1-060, PGSL-3.2.2.1-070, PGSL-3.2.2.1-180]

PSOC-3.3.2.1-050 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring the EPS Metop satellite telecommands, from the Suitland Interface, in a throughput mode, to the Fairbanks CDA for uplink. [PGSL-3.2.2.1-080]

PSOC-3.3.2.1-060 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of acquiring the EPS Metop satellite global and Telemetry (TM) data by the NOAA CDA (Fairbanks) in compliance with AD-5. [PGSL-3.2.2.1-080]

PSOC-3.3.2.1-070 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring to the Suitland Interface the global data acquired from the EPS Metop satellites by the Fairbanks CDA station, in compliance with performance requirements (Sec.3.3.2.4). [PGSL-3.2.2.1-090]

PSOC-3.3.2.1-080 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of receiving the global and housekeeping telemetry data from the EPS Metop-1 and then Metop-2 satellites, for EPS cross support. [PGSL-3.2.2.1-090]

PSOC-3.3.2.1-090 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring the Metop satellite global data in pipeline mode and housekeeping telemetry data in throughput mode, to the Suitland interface. [PGSL-3.2.2.1-100, PGSL-3.2.2.4-040]

PSOC-3.3.2.1-100 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of receiving the real time Metop-1 and then Metop-2 MHRPT data from the PGS CDA stations. [PGSL-3.2.2.1-115]

PSOC-3.3.2.1-110 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of delivering the AVHRR data and Metop satellite housekeeping data, from MHRPT data, to the IPS element. [PGSL-3.2.2.1-115]

PSOC-3.3.2.1-120 Demo

The SOCC shall be capable of providing blind orbit cross-support to one operational EPS satellite with additional requests to be accommodated within the capability of the system, as defined in AD-3. [PGSL-3.2.2.1-120]

PSOC-3.3.2.1-130 Demo

The SOCC shall be capable of scheduling; then generating and forwarding telecommands in real time to the Darmstadt Interface, for NOAA satellite blind orbits. [PGSL-3.2.2.1-130, PGSL-3.2.2.3-070]

PSOC-3.3.2.1-140 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of acquiring and processing the NOAA satellite telecommand-echo from Darmstadt Interface. [PGSL-3.2.2.1-140]

PSOC-3.3.2.1-150 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of acquiring and processing the housekeeping telemetry data from the Darmstadt Interface, for NOAA satellite blind-orbits and cross-support operations. [PGSL-3.2.2.1-141]

PSOC-3.3.2.1-160 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of delivering to the Suitland Interface, the NOAA-N & then -N' global or SAIP or STIP data received at the PGS CDA stations in compliance with performance requirements. [PGSL-3.2.2.1-150]

PSOC-3.3.2.1-170 Analysis

The SOCC shall be capable of scheduling and controlling PGS functions in support of delivering to the Suitland Interface, the NOAA-N & then -N' split-mission global or SAIP or STIP data received at the PGS CDA stations per any of the combinations below. [PGSL-3.2.2.1-160]

(a) 2 orbits of GAC
(b) 1 orbit GAC and 1 orbit of SAIP
(c) 1 orbit GAC and 1 orbit of STIP
(d) 2 orbits SAIP
(e) 1 orbit SAIP and 1 orbit of STIP
(f) 2 orbits STIP

PSOC-3.3.2.1-180 Demo

The SOCC shall be capable of extracting the MHS telemetry data from NOAA satellites global data, and deliver it to the Darmstadt Interface, via the Communication element. [PGSL-3.2.2.1-160, PGSL-3.2.2.4-100]

PSOC-3.3.2.1-190 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of delivering to the Darmstadt Interface, the MHS telemetry data extracted from NOAA satellites. [PGSL-3.2.2.1-160, PGSL-3.2.2.4-100]

PSOC-3.3.2.1-200 Demo

The SOCC shall be capable of acquiring (via the Communication element) and processing the NOAA instrument housekeeping data from Metop satellites from the Darmstadt Interface. [PGSL-3.2.2.1-180]

PSOC-3.3.2.1-210 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of completing the delivery to the Suitland interface the global data from orbit N before starting the acquisition from orbit N+1. [PGSL-3.2.2.1-190]

3.3.2.2 Operational

PSOC-3.3.2.2-010 Demo

The SOCC shall be capable of supporting IJPS operations upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites. [PGSL-3.2.2.2-010]

PSOC-3.3.2.2-020 Demo

The SOCC shall be capable of commanding, monitoring/identifying the health and safety, and trouble-shooting of NOAA satellites, including all the instruments they carry regardless of their origin, in the IJPS period. [PGSL-3.2.2.2-030]

PSOC-3.3.2.2-030 Demo

In support of anomalous and emergency situations the SOCC shall receive and display telemetry data, acquired from the Darmstadt interface, for the NOAA delivered instruments on-board the EPS satellites. [PGSL-3.2.2.2-030]

PSOC-3.3.2.2-040 Demo

The SOCC shall coordinate all PGS support functions with the EPS ground segment for data and information exchange, the day-to-day satellite operations, and cross-support activities. [PGSL-3.2.2.3-030, PGSL-3.2.2.3-040, PGSL-3.2.2.3-080]

PSOC-3.3.2.2-050 Demo

The SOCC shall schedule, control and maintain the data buffering/distribution operations for both the Suitland and Darmstadt Interfaces. [PGSL-3.2.2.3-035, PGSL-3.2.2.3-065]

PSOC-3.3.2.2-060 Demo

The SOCC shall schedule and control PGS operations with the EPS ground segment, for cross-support telecommand and telemetry data transfers. [PGSL-3.2.2.2-050, PGSL-3.2.2.3-080]

PSOC-3.3.2.2-070 Demo

The SOCC shall schedule and coordinate all activities in the event of transmission failure at either Suitland or Darmstadt interface. [PGSL-3.2.2.2-060]

PSOC-3.3.2.2-080 Demo

In the event of transmission failure at either the Suitland or the Darmstadt interface, the SOCC shall coordinate backlog data supply services with the EPS ground segment. [PGSL-3.2.2.2-060]

3.3.2.3 Interface

PSOC-3.3.2.3-010 Demo

The SOCC shall monitor the Suitland communications interface operational performance. [PGSL-3.2.2.3-020]

PSOC-3.3.2.3-020 Demo

The SOCC shall monitor and control the "Generic File Transfer (GFT)" interface operations. [PGSL-3.2.2.3-021]

PSOC-3.3.2.3-030 Demo

The SOCC shall establish a voice loop with the EPS. [PGSL-3.2.2.3-025]

3.3.2.4 Performance

PSOC-3.3.2.4-010 Analysis

The SOCC shall be capable of supporting the launch of a POES within 120 days of notification. [PGSL-3.2.2.4-010]

PSOC-3.3.2.4-020 Analysis

The SOCC maximum downtime for GAC or GDS data transfer capability shall never exceed 360 minutes. [PGSL-3.2.2.4-080]

PSOC-3.3.2.4-030 Analysis

The SOCC maximum downtime for Metop telecommand data or Metop TM transfer capability shall never exceed 100 minutes. [PGSL-3.2.2.4-090]

PSOC-3.3.2.4-040 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring to the Suitland Interface, the NOAA-N & then -N' global or SAIP or STIP data received at the PGS CDA stations as defined below: [PGSL-3.2.2.4-030]

(a) In the time ordered manner (data sensed first shall be transferred first)
(b) Without any modification (no time stamp or quality indicator)
(c) Data made available at interface, should be compatible for acquiring by EPS ground segment in pipeline mode
(d) The last GAC or SAIP or STIP data shall be made available at the Suitland Interface not later than 100 minutes after data downlink completion.
(e) The first GAC or SAIP or STIP data shall be made available at the Suitland Interface not later than 2 minutes after the completion of the data downlink.
(f) Ensure that 98.8% of GDS data acquired is transferred successfully to the Suitland Interface in any 30 day period.

PSOC-3.3.2.4-050 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring to the Suitland Interface, the Metop blind orbit global data received at the PGS CDA stations as defined below: [PGSL-3.2.2.4-030]

(a) In the Virtual Channel Data Unit format (VCDU)
(b) Reed-Solomon error decoded and quality flags appended
(c) UTC time stamp appended, with accuracy better than 100 micro-secs. (TBC) and format to conform to the EPS Product Conventions Document [EPS/SYS/TEN/990007]
(d) Data made available at Suitland Interface, should be compatible for acquiring by EPS ground segment in pipeline mode
(e) Last Metop GDS shall be made available at the Suitland Interface not later than 100 minutes after data downlink completion.
(f) The first GDS shall be made available at the Suitland Interface not later than 2 minutes after the completion of the data downlink.
(g) Ensure that 98.8% of GDS data acquired is successfully transferred to the interface in any 30 day period

PSOC-3.3.2.4-060 Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring to the Suitland Interface, the Metop blind orbit telemetry (TM) data received at the PGS CDA stations as defined below: [PGSL-3.2.2.4-070]

(a) In the Virtual Channel Data Unit format (VCDU)
(b) UTC time stamp appended, with accuracy better than 100 micro-secs. (TBC) and format to conform to the EPS Product Conventions Document [EPS/SYS/TEN/990007]
(c) Data made available at the Suitland Interface, should be compatible for acquiring by EPS ground segment in pipeline mode
(d) Last Metop GDS shall be made available at the Suitland Interface not later than 100 minutes after data downlink completion.
(e) The first GDS shall be made available at the Suitland Interface not later than 2 minutes after the completion of the data downlink.

(f) Ensure that 98.8% of GDS data acquired is successfully transferred to the interface in any 30 day period

PSOC-3.3.2.4-070 Demo

The delay, between a complete Metop telecommand data reception at the Suitland Interface and its Uplink/transmission at the Fairbanks CDA station, shall be less than 1 second. [PGSL-3.2.2.1-080, PGSL-3.2.2.3-040]

3.3.3 Ingest and Preprocessing System (IPS) Element Requirements

3.3.3.1 Functional

PIPS-3.3.3.1-010 Demo

The IPS shall be capable of receiving the Metop global data in the CCSDS VCDU format and in a pipeline mode, from the Suitland Interface. [PGSL-3.2.2.1-10, PGSL-3.2.2.1-40, PGSL-3.2.2.1-220]

PIPS-3.3.3.1-020 Demo

The IPS shall be capable of receiving the NOAA satellites' blind orbit global data in a pipeline mode, from the Suitland Interface. [PGSL-3.2.2.1-220]

PIPS-3.3.3.1-030 Demo

The IPS shall be capable of extracting the common core instruments' data from the Metop global data [PGSL-3.2.2.1-220]

PIPS-3.3.3.1-040 Demo

The IPS shall be capable of ingesting the common instruments' data extracted from the Metop satellite global data. [PGSL-3.2.2.1-220]

PIPS-3.3.3.1-050 Demo

The IPS shall be capable of ingesting the NOAA satellite blind orbit global data. [PGSL-3.2.2.1-221, PGSL-3.2.2.1-222]

PIPS-3.3.3.1-055 Demo

The IPS shall provide instrument calibration databases for both the NOAA and Metop satellites to support product generation needs in the IJPS period. [PGSL-3.2.2.1-380]

PIPS-3.3.3.1-060 Demo

The IPS shall be capable of receiving and ingesting the AVHRR instrument and housekeeping telemetry data extracted from the Metop MHRPT data, in the CCSDS VCDU format, from the NOAA CDA stations. [PGSL-3.2.2.1-240, PGSL-3.2.2.4-110]

PIPS-3.3.3.1-070 Demo

The IPS shall be capable of preprocessing the common instruments data extracted from Metop global data to NOAA Level 1b data sets (for AVHRR full and reduced resolutions). [PGSL-3.2.2.1-220]

PIPS-3.3.3.1-080 Demo

The IPS shall be capable of preprocessing the NOAA blind orbit data received from Suitland Interface to NOAA Level 1b data sets. [PGSL-3.2.2.1-221, PGSL-3.2.2.1-222]

PIPS-3.3.3.1-090 Demo

The IPS shall be capable of preprocessing the AVHRR instrument data (full and reduced resolutions) extracted from Metop MHRPT data to NOAA Level 1b data sets. [PGSL-3.2.2.1-240]

PIPS-3.3.3.1-100 Demo

The PGS shall be capable of ingesting (and preprocessing) the Metop instrument Level 1 and level 2 products acquired from EPS, as requested by the NOAA user community. [PGSL-3.2.2.1-250, , DAY 2/Progressive development]

3.3.3.2 Operational

PIPS-3.3.3.2-010 Demo

The IPS shall support IJPS operations upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites. [PGSL-3.2.2.2-010]

PIPS-3.3.3.2-020 Demo

The IPS shall coordinate with SOCC for data/information exchanges, cross-support activities and contingency operations, related to EPS ground segment. [PGSL-3.2.2.2-030]

PIPS-3.3.3.2-030 Demo

The IPS shall communicate with the EPS ground segment via a GFT Interface to exchange respective auxiliary and coordination data/information as listed below [PGSL-3.2.2.3-060]:
(a) Satellite orbit state vector update (orbit prediction over the next 24 hours)
(b) Satellite OBT/UTC time correlation updates
(c) Instrument calibration parameters updates
(d) Others per JORP

PIPS-3.3.3.2-040 Demo

The IPS shall deliver to the SARR and SEM users the SARR 1b and SEM 1b data sets processed from the Metop global data. [Derived from existing requirement]

PIPS-3.3.3.2-050 Demo

The IPS shall deliver to the EPS ground segment, via a GFT interface, the data needed to preprocess NOAA satellite instruments' data (e.g. satellite ephemeris, on-board time correlation and instrument calibration parameters). [PGSL-3.2.2.1-200]

3.3.3.3 Interface

PIPS-3.3.3.3-010 Demo

The IPS shall interface with the Suitland Interface, via the communication interface, for the following: [PGSL-3.2.2.3-020]:

a) Reception of NOAA satellites blind orbit global data from EPS
b) Metop satellite global data/information
c) Cross-support data exchange with the EPS ground segment

PIPS-3.3.3.3-020 Demo

The IPS shall have a GFT protocol interface with the EPS ground segment for the following:

(a) To deliver the data needed to preprocess NOAA satellite instrument data (e.g. satellite ephemeris or orbital state, on-board time correlation, instrument calibration parameters). [PGSL-3.2.2.3-021] and,
(b) Receive the data needed to preprocess EPS Metop satellite instrument data (e.g. satellite ephemeris, on-board time correlation and instrument calibration parameters). [PGSL-3.2.2.1-210]

3.3.3.4 Performance

PIPS-3.3.3.4-010 Demo

The IPS shall be capable of generating NOAA satellite Level 1 products in TBD minutes from the time of ingest. [NOAA req.]

PIPS-3.3.3.4-020 Demo

The IPS shall be capable of generating the AVHRR instrument (data extracted from MHRPT) Level 1 data set in TBD minutes from the time of ingest. [NOAA req.]

PIPS-3.3.3.4-030 Demo

The IPS shall be capable of generating Metop satellite Level 1 products in TBD minutes from ingest at the IPS. [DAY 2/Progressive development]

PIPS-3.3.3.4-040 Demo

The IPS shall store the NOAA satellite Level 1 products for a period of TBD days/months. [NOAA req.]

PIPS-3.3.3.4-050 Demo

The IPS shall store the Metop satellite Level 1 products for a period of TBD days/months. [NOAA req.]

3.3.4 Product Generation & Distribution System (PGD) Element Requirements

3.3.4.1 Functional

PPGD-3.3.4.1-010 Demo

The PGD shall be capable of receiving the stored data of common instruments Level 1 data sets (in full and reduced resolutions) processed by the IPS element, in pipeline mode and granule format. [PGSL-3.2.2.1-010, PGSL-3.2.2.1-040, PGSL-3.2.2.1-230, PGSL-3.2.2.1-235]

PPGD-3.3.4.1-020 Demo

The PGD shall be capable of receiving the real-time AVHRR Level 1 data sets from the Metop MHRPT processed by the IPS element, in pipeline mode and granule format. [PGSL-3.2.2.1-245, PGSL-3.2.2.4-110]

PPGD-3.3.4.1-030 Demo

The PGD shall be capable of receiving the EUMETSAT instruments Level 1 products ingested by the IPS element in pipeline mode and granule format. [PGSL-3.2.2.1-260, DAY 2/Progressive development]

PPGD-3.3.4.1-040 Demo

The PGD shall be capable of receiving the EUMETSAT instruments Level 2 products ingested by the IPS element in pipeline mode and granule format. [PGSL-3.2.2.1-270, DAY 2/Progressive development]

PPGD-3.3.4.1-050 Demo

The PGD shall be capable of receiving all ancillary data required for the generation of Level 2 products from Level 1 data sets. [PGSL-3.2.2.1-230, PGSL-3.2.2.1-245]

PPGD-3.3.4.1-060 Demo

The PGD shall upgrade current or develop new science algorithms and product generation systems for all required Level 2 products from the common instruments Level 1 data sets. [PGSL-3.2.2.1-230]

PPGD-3.3.4.1-070 Demo

The PGD shall develop new science algorithms and product generation systems for all required Level 2 products, if not received from EPS, from the EUMETSAT instruments Level 1 data sets. [TBD, PGSL-3.2.2.1-260, DAY 2/Progressive development]

PPGD-3.3.4.1-080 Demo

The PGD shall generate Level 2 and Level 3 products from the common instruments Level 1 data sets, to meet user requirements. [PGSL-3.2.2.1-230, PGSL-3.2.2.1-235]

PPGD-3.3.4.1-090 Demo

The PGD shall generate Level 2 and Level 3 products, if not received from EPS, from the EUMETSAT instruments Level 1 data sets, to meet user requirement. [TBD, PGSL-3.2.2.1-260, DAY 2/Progressive development]

PPGD-3.3.4.1-100 Demo

The PGD shall have the capability to distribute all products generated by the PGD element to the archive facilities and NOAA user community via the Communication. element. [PGSL-3.2.2.1-290]

3.3.4.2 Operational

PPGD-3.3.4.2-010 Demo

The PGD shall be ready to support IJPS operations upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites. [PGSL-3.2.2.2-010]

PPGD-3.3.4.2-020 Demo

The PGD shall perform the quality control of all products produced by the PGD for IJPS. [OSDPD standards]

PPGD-3.3.4.2-030 Demo

The PGD shall coordinate with IPS and communication elements for all data/information exchanges, cross-support activities and contingency operations, related to NOAA/IJPS/EPS ground segments. [PGSL-3.2.2.2-030]

PPGD-3.3.4.2-040 Demo

The PGD shall distribute all products generated by the PGD element as per predetermined schedule between PGD and the NOAA users. [PGSL-3.2.2.1-290]

3.3.4.3 Interface

PPGD-3.3.4.3-010 Demo

The PGD shall interface with the IPS, via communications element, for all data input needs, from both NOAA and Metop satellites. [PGSL-3.2.2.1-370]

PPGD-3.3.4.3-020 Demo

The PGD shall interface with the communication element for all ancillary data input needs from other elements. [PGSL-3.2.2.1-370]

PPGD-3.3.4.3-030 Demo

The PGD shall interface with the communication element for the distribution of all products produced by the PGD element. [PGSL-3.2.2.1-370]

3.3.4.4 Performance

NONE

3.3.5 Data Archive & Access System (AAS) Requirements

3.3.5.1 Functional

PDAA-3.3.5.1-010 Inspection

The AAS shall include at least one Archive, Access and Distribution Facility for the IJPS period. [PGSL-3.2.2.1-10, PGSL-3.2.2.1-40, PGSL-3.2.2.1-300]

PDAA-3.3.5.1-020 Demo

The AAS shall be capable of archiving all global data [TBD] from Metop satellite in the IJPS period. [PGSL-3.2.2.1-300]

PDAA-3.3.5.1-030 Demo

The AAS shall be capable of archiving the IASI 1c, GOME 1b and GRAS 1b, instrument data received from the EPS, in the IJPS period. [PGSL-3.2.2.1-300, PGSL-3.2.2.1-320, PGSL-3.2.2.1-330]

PDAA-3.3.5.1-040 Demo

The AAS shall be capable of archiving all ancillary, metadata, and supporting databases for NOAA satellite data in the IJPS period. [PGSL-3.2.2.1-300, PGSL-3.2.2.1-320]

PDAA-3.3.5.1-050 Demo

The AAS shall be capable of archiving all ancillary, metadata, and supporting databases for Metop satellite data in the IJPS period. [PGSL-3.2.2.1-310, PGSL-3.2.2.1-320]

PDAA-3.3.5.1-060 Demo

The AAS shall be capable of archiving all Level 2 and Level 3 products generated by the PGS from both NOAA and Metop satellite data in the IJPS period. [PGSL-3.2.2.1-300, PGSL-3.2.2.1-320, PGSL-3.2.2.1-330]

PDAA-3.3.5.1-070 Demo

The AAS shall be capable of distributing Level 1 product produced from Metop satellite global data in the IJPS period to users. [PGSL-3.2.2.1-280]

PDAA-3.3.5.1-080 Demo

The AAS shall be capable of distributing NOAA Level 2 and 3 products from the Metop satellite data in the IJPS period to users. [PGSL-3.2.2.1-290]

PDAA-3.3.5.1-090 Demo

The AAS shall be capable of distributing all archived ancillary, metadata, and supporting databases for both NOAA and Metop satellite to users in the IJPS period. [PGSL-3.2.2.1-290]

Operational

PDAA-3.3.5.2-010 Demo

The AAS shall be accessible for retrieval/distribution of all archived data and products by the NOAA user community. [PGSL-3.2.2.1-280, PGSL-3.2.2.1-290]

Interface

PDAA-3.3.5.3-010 Demo

The AAS shall interface with the IPS element, via communication element, for receiving Level 1 data and associated databases for archiving in the IJPS period. [PGSL-3.2.2.1-370]

PDAA-3.3.5.3-020 Demo

The AAS shall interface with the PGD element, via communication element, for receiving Level 2 and higher products and associated databases for archiving in the IJPS period. [PGSL-3.2.2.1-370]

PDAA-3.3.5.3-030 Demo

The AAS shall provide an interface to locate and retrieve the archived data and information for the NOAA user community. [PGSL-3.2.2.3-090]

Performance

PDAA-3.3.5.4-010 Analysis

The AAS shall be sized for archiving all designated data/information in support of the IJPS mission. [PGSL-3.2.2.1-300, PGSL-3.2.2.1-310, PGSL-3.2.2.1-320, PGSL-3.2.2.1-330]

3.3.6 Communications Element Requirements

3.3.6.1 Functional

PCOM-3.3.6.1-010 Demo

The Communications Element shall provide for telecommunications capabilities among the PGS elements and Users to ensure the following: [PGSL-3.2.2.1-10, PGSL-3.2.2.1-60, PGSL-3.2.2.1-70, PGSL-3.2.2.1-80, PGSL-3.2.2.1-90, PGSL-3.2.2.1-350, PGSL-3.2.2.4-110]
(a) Data and information exchange
(b) Timeliness requirement as defined by each element
(c) Meet data transfer reliability as defined by each element

PCOM-3.3.6.1-020 Demo

The Communications Element network shall be sized based on the individual element needs for the data types, information and timeliness requirements. [PGSL-3.2.2.1-340]

PCOM-3.3.6.1-030 Demo

RESERVED

PCOM-3.3.6.1-040 Demo

The Communications Element shall ensure data interchange and interface compatibility among the PGS elements for data rates, data types, data quantity and modes of operation. [PGSL-3.2.2.1-340]

PCOM-3.3.6.1-050 Demo

The Communications Element shall provide telecommunications capabilities between the Suitland/single point and Darmstadt/single point Interfaces for acquiring from Darmstadt the following data types. [PGSL-3.2.2.1-10, PGSL-3.2.2.1-060, PGSL-3.2.2.1-070, PGSL-3.2.2.1-080, PGSL-3.2.2.1-90, PGSL-3.2.2.1-360, PGSL-3.2.2.3-050]
(a) NOAA GAC/SAIP/STIP in pipeline mode
(b) Metop global data in pipeline mode
(c) NOAA TIP/AIP/HRPT in throughput mode
(d) NOAA TC Echo in throughput mode

PCOM-3.3.6.1-060 Demo

The Communications Element shall provide telecommunications capabilities between the Suitland/single point and Darmstadt/single point Interfaces for transferring to Darmstadt the following data types. [PGSL-3.2.2.3-050]
(a) NOAA satellite telecommands for NOAA blind orbits in throughput mode
(b) MHS instrument and telemetry data

3.3.6.2 Operational

PCOM-3.3.6.2-010 Demo

The Communications Element shall not disrupt existing data/information links between the PGS and external agencies/entities, including NWS and DOD, in the IJPS period. [PGSL-3.2.2.1-370, PGSL-3.2.2.3-100, PGSL-3.2.2.3-110]

3.3.6.3 Interface

PCOM-3.3.6.3-010 Demo

The Communications Element shall network and ensure interface compatibility between all the PGS element interfaces as required by each element. [PGSL-3.2.2.1-340]

PCOM-3.3.6.3-020 Demo

The Communications Element shall ensure complete interface compatibility between the Suitland and Darmstadt Interface points for all types of data reception and transmission. [PGSL-3.2.2.1-350, PGSL-3.2.2.1-360, PGSL-3.2.2.3-020]

PCOM-3.3.6.3-030 Demo

The Communications Element shall provide a data buffering capacity at the Suitland Interface, for data acquired from Fairbanks CDA, to contain a minimum of one complete download of NOAA GAC or SAIP or STIP and one complete download of GDS data, at all times. [PGSL-3.2.2.3-035]

PCOM-3.3.6.3-040 Demo

The Communications Element shall provide a data buffering capacity, for data acquired from Darmstadt Interface, to contain a minimum of one complete download of NOAA GAC or SAIP or STIP data and one complete download of GDS data, at all times. [PGSL-3.2.2.3-065]

3.3.6.4 Performance

PCOM-3.3.6.4-010 Demo

The Communications Element shall size the Communications network between the Fairbanks CDA station and the Suitland Interface to comply with the following data transport criteria. [PGSL-3.2.2.4-020, PGSL-3.2.2.4-050, PGSL-3.2.2.4-060, PGSL-3.2.2.4-080]

(a) Always ensure that 98.8% of any data type is successfully transferred between the Fairbanks CDA station and the Suitland interface over any 30 day period
(b) First global data no later than 2 minutes after loss of signal
(c) Last data no later than 100 minutes after download completion
(d) The delay, between the TM Frame complete acquisition at the CDA station and its availability at the interface, shall be less than 1 second
(e) Maximum downtime of the TM/TC transport chain between the CDA station and the interface shall not exceed 100 minutes

PCOM-3.3.6.4-020 Demo

The Communications Element shall size the Communications network between the NOAA CDA station and the Suitland Interface to comply with the following Metop satellite data transport criteria. [PGSL-3.2.2.4-030]

(a) UTC time stamp appended
(b) First data no later than 2 minutes after download completion
(c) Last data no later than 100 minutes after download completion
(d) Data available in a pipeline mode

PCOM-3.3.6.4-030 Analysis

The Communications Element shall not exceed a 360 minutes maximum downtime limit for the NOAA CDA station to the Suitland Interface data delivery chain. [PGSL-3.2.2.4-080]

PCOM-3.3.6.4-040 Demo

The Communications Element shall size the link(s) between the Suitland and Darmstadt interfaces to accommodate the following: [PGSL-3.2.2.1-350, PGSL-3.2.2.1-360]

(a) Data quantity
(b) Data rate
(c) Bit error rate

4 Verification and Validation (V&V) Requirements

This section presents the overall Verification and Validation (V&V) program requirements for the NOAA POES System for its support of the IJPS system.

4.1 Scope

The scope of the POES system V&V activities to support the IJPS system shall provide the basis for verifying and validating all the requirements stated in Section 3 of this document. Methods used in V&V activities for the POES system changes/modifications include analysis, demonstration, inspection, and test.

The overall V&V activities are performed in discrete phases that include the Procurement/Contract, POES Launch Readiness, and POES and EPS Joint Systems test phases as described herein. During the Procurement/Contract phase, V & V activities shall be required under all procurement/contract actions to update the POES system to support the IJPS system. Verification activities may include reviewing analyses resulting from design and development activities and witnessing testing required by the contract. Inspections and demonstrations may also be performed, as appropriate and included in the contractor's approved plans.

NOAA performs POES Launch Readiness V&V activities on a continuing basis to prepare for future POES missions. This phase includes the V & V of system upgrades, flight-to-flight changes, and major changes/modifications to enhance the POES System. The changes/modifications to the POES system to support the IJPS system shall be tested during Launch Readiness activities to assess their compliance with POES requirements. Launch Readiness V & V activities are progressive and includes element, segment, and system level tests. Completion of the Launch Readiness V&V phase will represent the milestone that the POES System is ready to support POES and EPS Joint Systems phase of testing.

POES and EPS Joint Systems V & V shall be conducted to validate interface and compatibility requirements between the two systems. This phase of joint V&V activities requires the resources of both the POES and EPS systems and has to perform in proper synchronization. In the IJPS time period, NOAA and EUMETSAT are responsible for operating the POES and EPS systems respectively in support of the IJPS mission. Joint tests will validate that the POES and EPS systems are operationally compatible in sending commands to their respective satellite, and in receiving satellite environmental and telemetry data. Joint testing will validate that satellite data can be shared between systems while satisfying product processing timeliness requirements. Testing will also verify that planned joint contingency operations can be supported. With the completion of the POES and EPS Joint Systems V & V activity phase, all requirements on the POES system for its support to the IJPS system will be verified and validated.

4.2 General Requirements

The following general requirements shall be common to all phases of the NOAA POES V&V activities. These requirements will be reflected in the preparation of detailed documents as defined herein and in the conduct of the required activities, as appropriate.

1. V & V documentation shall be provided by the NESDIS organizational element with assigned responsibilities for each system element. The NESDIS Office of Systems Development (OSD) shall be responsible for providing guidance to NESDIS organizational elements through the NOAA POES System Master Verification and Validation Plan for IJPS.
2. V & V documentation will be updated to reflect the latest changes in requirements that result from changes to the baseline requirements.
3. Successful completion of V&V activities for each level of POES Launch Readiness testing and for each phase of IJPS Joint System testing will be used to mark milestones to measure progress.
4. Inspections shall be performed prior to each test. Individual test inspections will ensure that the test configuration is in accordance with approved test procedures, equipment and software under test are at the correct revision level, and that prior deficiencies or discrepancies have been corrected.
5. V&V activity shall be conducted in the actual operational environment for the POES and IJPS systems. If it not possible due to complexity, cost, etc, the environment will be a very close simulation of the actual operational environment.
6. Actual data from operational satellites shall be used to support planned verification and validation testing. If such data is not available, very close simulated data may be used.
7. The test data types, formats, rates and quantities shall simulate actual operational conditions.
8. End-to-end test scenarios shall be part of V & V testing activities to verify system interfaces and overall system performance of the integrated POES system.

4.3 Documentation Requirements

The following standard documents shall be used for all phases of POES system V & V as appropriate.

4.3.1 Verification and Validation Plans

NESDIS/OSD will prepare the NOAA POES System Master Verification and Validation Plan for IJPS to provide NOAA and EUMETSAT with a concise document containing information to plan, coordinate, conduct, report and track NOAA's IJPS system V & V activities. V & V plans will also be prepared for each level and phase of POES testing as required to implement V & V activities. Plans will describe in specific terms how the requirements on the POES system will be satisfied. V & V plans will serve as the basis for preparation of V & V procedures. Contractor prepared plans will follow the general requirements contained in Section 4.2. The assigned NESDIS organization for each POES system element will prepare a V & V plan to coordinate required resources and requirements to be satisfied. OSD will prepare a POES System Verification and Validation Plan for IJPS requirements that addresses the POES Segment integration and System level verifications, based on the successful verification of all element

level requirements prior to starting these tests. Coordination of the overall planning effort is the responsibility of OSD.

OSD will be the focal point for establishing and coordinating with EUMETSAT, validation requirements for POES and EPS Joint Systems. These requirements will be documented in a Joint Plan for the POES and EPS systems.

4.3.2 Verification and Validation Procedures

V & V procedures shall be prepared for each approved V & V plan. Separate procedures will be prepared for each test to be performed in the approved plans. Contractor procedures to verify Section 3 requirements will be prepared for Government approval. The assigned NESDIS organization for each POES system element will prepare procedures to verify each change/modification to POES system elements. OSO, OSDPD, and NCDC will prepare new and updated procedures for conducting tests for the integration of POES Ground Segment elements and the POES System to validate that the POES system is ready for joint testing with the EPS system. OSO will also be responsible for preparing and coordinating POES test procedures for conducting joint testing activities with the EPS to validate IJPS requirements. OSDPD and NCDC will provide inputs to joint test procedures requiring the support of POES system elements under their control.

4.3.3 Event Logs

Event logs shall be used to maintain a record during the conduct of all POES testing. Event logs shall contain, but not be limited to, the following information:

1. Results of pretest inspections,
2. Exceptions to approved test procedures and test configurations,
3. Start and completion times of tests,
4. Test anomalies, including unexpected test results or equipment failures,
5. Corrections taken to fix test anomalies,
6. Results of retesting performed to verify corrective actions, and
7. Test procedure paragraph references and the date and time of entry.

4.3.4 Reports

Reports will be prepared for all levels and phases of the V & V activities as identified in the NOAA IJPS System Master Verification and Validation Plan for IJPS.

4.4 Requirements Allocation and Traceability

Included in Attachment A-1 is the POES System Requirements Traceability and Verification Matrix. This table lists the system level requirements identified in Section 3 and associates them with the allocated requirements at the segment level that comprise the requirement. The level at which verification will be performed and the verification method to be used are also identified.

Included in Attachment A-2 is the POES Segment Requirements Traceability and Verification Matrix. This table lists the requirements identified in Section 3 that have been allocated to the POES segments and associates them with the allocated requirements at the element level that comprise the requirement. The level at which verification will be performed and the verification method to be used are also identified.

ATTACHMENT A-1
System Requirements Traceability and Verification Matrix

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
	3.1 System Requirements **3.1.1 Functional**						
PSYS-3.1.1-010	The POES system shall collect, exchange, and disseminate global environmental data to users for operational meteorological and environmental forecasting and global climate monitoring in support of the IJPS mission.	PIP, 2.4.1	PSAT-3.2.1.1.1-010, PGSL-3.2.2.1-010			JD	.
PSYS-3.1.1-015	The POES system shall collect and disseminate local data in real time to users for operational meteorological and environmental forecasting in support of the IJPS mission.	PIP, 3.1	PSAT-3.2.1.1.1-050 PGSL-3.2.2.1-115			JD	
PSYS-3.1.1-020 (a)	The POES system shall be comprised of the following: -a series of two operational satellites (NOAA-N and -N') flown consecutively in an orbit with an "afternoon" equatorial crossing time (ascending node)	PIP, 3.1	PSAT-3.2.1.1.1-020 PSAT-3.2.1.1.2-010 PSAT-3.2.1.1.3-010 PSAT-3.2.1.1.4-010 PSLV-3.2.1.2.1-010 PSLV-3.2.1.2.1-020 PSLV-3.2.1.2.2-010 PSLV-3.2.1.2.3-010 PSLV-3.2.1.2.4-010 PSLV-3.2.1.2.4-020		D, I		
PSYS-3.1.1-020 (b)	The POES system shall be comprised of the following: -a series of two spacecraft with a set of common (with Metop) instruments (AVHRR, HIRS, AMSU-A, MHS, SEM , SARSAT and A-DCS) and an additional instrument (SBUV) unique to the POES mission.	PIP, 2.5.1, 3.1, 3.2.1	PSAT-3.2.1.1.1-030		D, I		
PSYS-3.1.1-020 ©	The POES system shall be comprised of the following: -at least one Command and Data Acquisition (CDA) station and a geographically separate back-up	PIP, 3.1.	PGSL-3.2.2.1-020		D, I		
PSYS-3.1.1-020 (d)	The POES system shall be comprised of the following: -at least one Satellite Operations Control Center and a geographically separate back up	PIP, 3.1	PGSL-3.2.2.1-030		D, I		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PSYS-3.1.1-020 (e)	The POES system shall be comprised of the following: - at least one Data Processing, Distribution and Archive Facility, and	PIP, 3.1	PGSL-3.2.2.1-040		D, I		
PSYS-3.1.1-020 (f)	The POES system shall be comprised of the following: -telecommunications capabilities for command, telemetry and data exchange.	PIP, 3.1, 3.2.1, 3.2.3	PGSL-3.2.2.1-340 PGSL-3.2.2.1-350 PGSL-3.2.2.1-360 PGSL-3.2.2.1-370		D, I		
PSYS-3.1.1-030	The POES system global data shall include the NOAA satellite instrument set and spacecraft/instrument state of health.	PIP, 3.1	PSAT-3.2.1.1.1-040		D		
PSYS-3.1.1-040	The Metop global data (GDS) acquired by the POES system from the EPS ground segment shall include the common instrument set and the additional Metop instrument set (Infrared Atmospheric Sounding Interferometer (IASI), Advanced Scatterometer (ASCAT), Global Navigation Satellite System Receiver for Atmospheric Sounding (GRAS), and Global Ozone Monitoring Experiment (GOME-2)), spacecraft/instrument state of health and administrative messages.	PIP, 3.1	PGSL-3.2.2.1-050			JD	
PSYS-3.1.1-050	The POES system shall retrieve from the EPS ground segment the Metop-1 and then Metop-2 satellites global data.	PIP, 3.6.3	PGSL-3.2.2.1-050			JD	
PSYS-3.1.1-060	The POES system shall provide a throughput mode commanding access to the EPS Metop-1 and then Metop-2 satellites via a PGS CDA station, for cross-support and contingency operations.	PIP, 3.6.1.2	PGSL-3.2.2.1-080			JD	
PSYS-3.1.1-061	The POES system shall transmit Metop telecommands, received from the EPS ground segment, to the Metop satellites through the POES CDA station, in support of Metop blind orbits and cross support operations.	PIP, 3.6.1.2	PGSL-3.2.2.1-080			JD	
PSYS-3.1.1-062	The POES system shall make available to EPS ground segment the Metop telecommand-echo, for cross-support operations, in a real-time throughput mode.	PIP, 3.6.1.2	PGSL-3.2.2.1-145			JD	
PSYS-3.1.1-070	The POES system shall receive housekeeping telemetry data from the Metop-1 and then Metop-2 satellites while over the PGS CDA station for cross-support operations and make it available to EPS ground segment, in a real-time throughput mode.	PIP, 3.6.1.2	PGSL-3.2.2.1-090 PGSL-3.2.2.1-100 PGSL-3.2.2.1-110			JD	

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PSYS-3.1.1-075	The POES system shall acquire real time MHRPT data from the Metop-1 and then Metop-2 satellite while over the PGS CDA station and process/extract the AVHRR instrument and telemetry data, and transfer it to the NOAA IPS element.	NOAA	PGSL-3.2.2.1-115 PGSL-3.2.2.1-116			JT	
PSYS-3.1.1-080	The POES system shall be sized to provide blind orbit cross-support to one operational EPS satellite with any additional requests to be accommodated within the sizing of the system.	PIP, 3.6.1.2, 3.6.3	PGSL-3.2.2.1-120		A		
PSYS-3.1.1-090	The POES system shall be capable of scheduling, generating and transferring satellite commands to the NOAA-N and then NOAA-N' satellites via the EPS ground segment, in real-time, for NOAA blind orbit cross-support operations.	PIP, 3.6.1.2	PGSL-3.2.2.1-130			JD	
PSYS-3.1.1-100	The POES system shall acquire NOAA-N and NOAA-N' real-time housekeeping telemetry data from the EPS ground segment for NOAA blind orbit and cross-support operations.	PIP, 3.6.1.2	PSAT-3.2.1.1.1-060 PGSL-3.2.2.1-141			JD	
PSYS-3.1.1-105	The POES system shall acquire the NOAA-N and -N' telecommand-echo made available by the EPS PCDA station in real time, for NOAA blind orbit and cross-support operations.	PIP, 3.6.1.2	PGSL-3.2.2.1-140			JD	
PSYS-3.1.1-110	The POES system shall make available to the EPS ground segment the global data collected from NOAA-N and then NOAA-N' satellites, at the PGS CDA stations.	PIP, 3.6.3	PGSL-3.2.2.1-150 PGSL-3.2.2.1-160 PGSL-3.2.2.1-400				
PSYS-3.1.1-120	The POES system shall be capable of receiving global data from the Metop-1 and then from Metop-2 satellites while over the PGS CDA station, for EPS blind orbits.	PIP, 3.6.3 EPS IRD, 4.2, Metop S-G IS,	PGSL-3.2.2.1-090			JD	
PSYS-3.1.1-130	The POES system shall make available to EPS ground segment the global data from Metop-1 and then from the Metop-2 satellites acquired by the PGS CDA station (Virtual Channel Data Units (VCDU), decoded and with the corresponding time stamp and quality flags appended).	PIP, 3.6.3	PGSL-3.2.2.1-100 PGSL-3.2.2.1-410			JD	
PSYS-3.1.1-140	The POES system shall retrieve from the EPS ground segment the global data of NOAA-N and then from the NOAA-N' satellites for NOAA blind orbits.	PIP, 3.6.3	PSGL-3.2.2.1-060 PSGL-3.2.2.1-070 PGSL-3.2.2.1-115			JD	

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PSYS-3.1.1-150	The POES system shall complete the transfer of the global data from orbit N, to the NOAA interface for EPS to retrieve, before starting the acquisition from N+1.	PIP, 3.6.3	PGSL-3.2.2.1-221			JD	
PSYS-3.1.1-160	The POES system shall make available to the EPS ground segment (at the Darmstadt Interface) the MHS housekeeping data received from the NOAA satellites.	PIP, 3.6.1.3	PGSL-3.2.2.1-170			JD	
PSYS-3.1.1-170	The POES system shall acquire the housekeeping data, for the NOAA provided instruments, from the EPS ground segment, received from the EPS Metop satellites.	PIP, 3.6.1.3	PGSL-3.2.2.1-180			JD	
PSYS-3.1.1-180	The POES system shall make available to the EPS all the data necessary to preprocess NOAA satellite instrument data (e.g. satellite ephemeris or orbital-state, on-board time correlation, instrument calibration parameters and updates).	PIP, 3.1, 3.6.3,	PGSL-3.2.2.1-200 PGSL-3.2.2.3-021			JD	
PSYS-3.1.1-190	The POES system shall acquire from the EPS ground segment all the data necessary to process Metop satellite instrument data (e.g. satellite ephemeris or orbital state, on-board time correlation, instrument calibration parameters and updates).	PIP, 3.1, 3.6.3	PGSL-3.2.2.1-210			JD	
PSYS-3.1.1-200	The POES system shall be capable of ingesting and preprocessing the common core instrument data extracted from the Metop global data, to NOAA Level 1 (i.e. sorting of the data, earth location and appending or application of the calibration coefficients, and performance of the associated quality control).	PIP, 2.5.1, 3.6.4	PGSL-3.2.2.1-220			JD	
PSYS-3.1.1-210	The POES system shall be capable of ingesting and preprocessing the AVHRR instrument and telemetry data extracted (at NOAA CDA station) from Metop HRPT, for NOAA users. [NOAA morning mission req.]	NOAA	PGSL-3.2.2.1-240 PGSL-3.2.2.1-245		T		
PSYS-3.1.1-220	The POES system shall receive and process the Metop instrument Level 1 (and Level 2-TBC) data from the EPS ground segment, to meet NOAA user requirements.	PIP, 3.6.4 NOAA Day 2/ Progressive Dev.	PGSL-3.2.2.1-220 PGSL-3.2.2.1-222 PGSL-3.2.2.1-230 PGSL-3.2.2.1-235 PGSL-3.2.2.1-260 (Day 2/Prog. Dev.)			D, JT	

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PSYS-3.1.1-230	The POES system shall distribute all preprocessed global data and products produced by NOAA to the user community.	PIP, 3.6.4	PGSL-3.2.2.1-280 (Day 2/Prog. Dev.) PGSL-3.2.2.1-290 (Day 2/Prog. Dev.)		D		
PSYS-3.1.1-250	The POES system shall archive global data and associated databases received from the Metop satellites.	PIP, 3.6.4	PGSL-3.2.2.1-300 PGSL-3.2.2.1-310		D		
PSYS-3.1.1-260	The POES system shall archive all products generated by the PGS from Metop satellite data.	PIP, 3.6.4	PGSL-3.2.2.1-320 PGSL-3.2.2.1-330 (Day 2/Prog. Dev.)		D		
PSYS-3.1.1-270	The POES system shall provide for telecommunications capabilities among the PGS elements, to ensure timely and reliable exchange of command, telemetry/housekeeping and global data, and systems information in support of IJPS operations.	MOA, 3.3.4 PIP, 3.6.1.2, 3.6.1.3, 3.6.3	PGSL-3.2.2.1-340 PGSL-3.2.2.1-370 PGSL-3.2.2.2-050 PGSL-3.2.2.2-060 PGSL-3.2.2.3-021		D		
PSYS-3.1.1-275	The POES system shall provide for telecommunications capabilities between the Suitland interface and the Darmstadt interface, to ensure timely and reliable exchange of command, telemetry/housekeeping and global data, and systems information in support of IJPS operations.	MOA, 3.3.4 PIP, 3.6.1.2, 3.6.1.3, 3.6.3	PGSL-3.2.2.1-350 PGSL-3.2.2.1-360 PGSL-3.2.2.2-040			JD	
PSYS-3.1.1-280	The POES system shall maintain instrument calibration databases for the Metop satellite instruments, to support product generation needs in the IJPS period.	PIP, 3.6.1, 3.6.4	PGSL-3.2.2.1-380		D		
	3.1.2 Operational						
PSYS-3.1.2-010	The POES system operational phase for an IJPS satellite shall start upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites.	PIP, 3.6.1.1	PGSL-3.2.2.2-010		A		
PSYS-3.1.2-020	The POES system shall control the day-to-day operations, in coordination with the EPS ground segment, anomaly resolution and health/safety of NOAA satellites including all instruments (regardless of the origin) in the IJPS period.	PIP, 3.6.1.1, 3.6.4	PGSL-3.2.2.2-030		D		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PSYS-3.1.2-030	The POES system shall provide for a rolling archive of 7 days of the NOAA-N and N' and Metop global data acquired at the CDA stations.	PIP, 3.6.3	PGSL-3.2.2.2-020		D		
PSYS-3.1.2-040	The POES system shall develop detailed joint plans and procedures with EPS for supporting nominal, contingency and split-mission scenario operations.	PIP, 3.6.2	PGSL-3.2.2.2-060 PGSL-3.2.2.2-070 PGSL-3.2.2.2-080			JA	
	3.1.3 Interface						
PSYS-3.1.3-010	The POES system shall be capable of interfacing with the EPS space segment as defined in AD-5 (L, S, and X bands).	PIP, 3.6.1.2, 3.6.3, L-Band TBD	PGSL-3.2.2.1-390 PGSL-3.2.2.3-010 PGSL-3.2.2.3-120			JD	
PSYS-3.1.3-020	The POES system shall be capable of exchanging data with EPS ground segment as established in Article 8 of the IJPS Agreement and as applicable to NOAA.	PIP, 3.6.3	PGSL-3.2.2.2-080 PGSL-3.2.2.3-021 PGSL-3.2.2.3-025			JD	
PSYS-3.1.3-030	The POES system shall provide for a NOAA Suitland Interface for data exchange, cross-support operational activities, day-to-day joint tasks coordination, and blind orbit support with the EPS ground segment.	PIP, 3.6.1.2, 3.6.3	PGSL-3.2.2.3-020 PGSL-3.2.2.3-030 PGSL-3.2.2.3-035 PGSL-3.2.2.3-040			JD	
PSYS-3.1.3-035	The POES system shall provide for a voice loop exchange for operational coordination with the EPS.	PIP, 3.6.2	PGSL-3.2.2.3-025			JD	
PSYS-3.1.3-040	The POES system shall be capable of interfacing with the EPS ground segment (Darmstadt Interface) for NOAA to retrieve/exchange information in support of IJPS operations.	PIP, 3.6.3	PGSL-3.2.2.3-050 PGSL-3.2.2.3-060 PGSL-3.2.2.3-070 PGSL-3.2.2.3-080		D		
PSYS-3.1.3-050	The POES system shall provide an interface for the distribution of the NOAA global data, to the Department of Defense in the IJPS period.	Shared Processing	PGSL-3.2.2.3-090 PGSL-3.2.2.3-100		D		
PSYS-3.1.3-060	The POES system shall provide an interface for the distribution of the common core instrument data extracted from Metop global data, to the Department of Defense in the IJPS period.	Shared Processing	PGSL-3.2.2.3-110		D		
	3.1.4 Performance						

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PSYS-3.1.4-010	The POES system shall be capable of supporting the launch of a new NOAA satellite within 120 days of notification.	MOA, 4.1.3	PGSL-3.2.2.4-010		A		
PSYS-3.1.4-020	The POES system shall make available to the EPS ground segment the data on a mutually agreed basis and meet the processing timeliness, as defined at the Segment and Element levels.	PIP, 3.6.3	PGSL-3.2.2.4-020 PGSL-3.2.2.4-030 PGSL-3.2.2.4-040 PGSL-3.2.2.4-050 PGSL-3.2.2.4-060 PGSL-3.2.2.4-070 PGSL-3.2.2.4-080 PGSL-3.2.2.4-090 PGSL-3.2.2.4-100			JT	
PSYS-3.1.4-030	The POES system shall complete product processing of the AVHRR instrument and telemetry data (extracted from MHRPT over NOAA CDA) and deliver product to users in less than 30 minutes from observation.	NOAA Users	PGSL-3.2.2.4-110		T		

ATTACHMENT A-2
Segment Requirements Traceability and Verification Matrix

Require-ment ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
	3.2 Segment Requirements						
	3.2.1 Space Segment requirements		Allocated to NASA				
	3.2 Polar Ground Segment Requirements **3.2.2.1 Functional**						
PGSL-3.2.2.1-010	The PGS shall be capable of receiving, processing, exchanging and disseminating global environmental data in support of the IJPS mission.	PSYS-3.1.1-010	PCDA-3.3.1.1-020 PSOC-3.3.2.1-010 PIPS-3.3.3.1-010 PPGD-3.3.4.1-010 PDAA-3.3.5.1-010 PCOM3.3.6.1-010/050		D		
PGSL-3.2.2.1-020	The PGS shall include at least one primary and a backup CDA station.	PSYS-3.1.1-020	PDCA-3.3.1.1-010		I		
PGSL-3.2.2.1-030	The PGS shall include at least one primary and a backup SOCC.	PSYS-3.1.1-020	PSOC-3.3.2.1-025		I		
PGSL-3.2.2.1-040	The PGS shall include at least one data processing, distribution and archive facility.	PSYS-3.1.1-020	PIPS-3.3.3.1-010 PPGD-3.3.4.1-010 PDAA-3.3.5.1-010		I		

Require-ment ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.1-050	The PGS shall be capable of acquiring from the Darmstadt Interface, the Metop-1 and then Metop-2 satellite global data, made available by EPS.	PSYS-3.1.1-040, PSYS-3.1.1-050	PSOC-3.3.2.1-030		D		
PGSL-3.2.2.1-060	The PGS shall be capable of acquiring from the Darmstadt Interface, the NOAA satellite blind orbit global data, made available by EPS.	PSYS-3.1.1-140	PSOC-3.3.2.1-040 PCOM-3.3.6.1-010/050		D		
PGSL-3.2.2.1-070	In the event the global data from NOAA-N or N' satellites is unavailable, the PGS shall be capable of acquiring the Stored AIP (SAIP) or Stored TIP (STIP) data from the Darmstadt Interface.	PSYS-3.1.1-140	PSOC-3.3.2.1-040 PCOM-3.3.6.1-010/050		D		
PGSL-3.2.2.1-080	The PGS shall be capable of receiving, transporting (in throughput mode) and uplinking telecommands to the Metop satellites through the POES CDA station, for Metop blind orbits, in compliance with performance requirements as applicable.	PSYS-3.1.1-060	PCDA-3.3.1.1-040/050 PCDA-3.3.1.4-100 PSOC-3.3.2.1-020/050/060 PSOC-3.3.2.4-070		D		
PGSL-3.2.2.1-090	The PGS shall be capable of receiving the global and housekeeping telemetry data from the Metop-1 and then Metop-2 satellite, for EPS cross-support operations, as defined in AD-5.	PSYS-3.1.1-070/120/130	PCDA-3.3.1.1-020 PSOC-3.3.2.1-050/070/080 PCOM-3.3.6.1-010/050		D		
PGSL-3.2.2.1-100	The PGS shall be capable of delivering to the Suitland Interface the global data acquired from the Metop satellites, by the PGS CDA station (Fairbanks) in compliance with performance requirements.	PSYS-3.1.1-070/130	PCDA-3.3.1.1-060/070 PCDA-3.3.1.4-080 PSOC-3.3.2.1-010/090		D		
PGSL-3.2.2.1-110	The PGS shall be capable of delivering to the Suitland Interface the Metop-1 and Metop-2 satellite housekeeping telemetry data in throughput mode, for cross support, and in compliance with performance requirements.	PSYS-3.1.1-070	PCDA-3.3.1.1-020 PCDA-3.3.1.4-080		D		
PGSL-3.2.2.1-115	The PGS shall receive the MHRPT data in real-time at the PGS CDA stations, as defined in AD-5.	PSYS-3.1.1-075	PCDA-3.3.1.1-020/025 PSOC-3.3.2.1-010/100/110		D		
PGSL-3.2.2.1-116	The PGS shall be capable of extracting and processing the AVHRR instrument and telemetry data from the MHRPT data for NOAA users.	PSYS-3.1.1-075	PCDA-3.3.1.1-030 PSOC-3.3.2.1-010		D		
PGSL-3.2.2.1-120	The PGS shall be sized to provide blind orbit cross-support to one operational EPS satellite with any additional requests to be accommodated within the sizing of the system.	PSYS-3.1.1-080	PCDA-3.3.1.1-080 PSOC-3.3.2.1-120		D		

Require-ment ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.1-130	The PGS shall be capable of scheduling, generating and delivering telecommands to the Darmstadt Interface, for transfer in real time to NOAA satellites by EPS ground segment, for NOAA blind orbit cross-support operations.	PSYS-3.1.1-090	PSOC-3.3.2.1-020/130		D		
PGSL-3.2.2.1-140	The PGS shall be capable of acquiring NOAA satellite telecommand-echo, from the Darmstadt Interface, for NOAA blind orbits.	PSYS-3.1.1-105	PSOC-3.3.2.1-140		D		
PGSL-3.2.2.1-141	The PGS shall be capable of acquiring NOAA satellite housekeeping telemetry in real time, from the Darmstadt Interface, for NOAA blind orbits.	PSYS-3.1.1-100	PSOC-3.3.2.1-150		D		
PGSL-3.2.2.1-145	The PGS shall be capable of acquiring and transferring to the Suitland Interface, the Metop telecommand-echo, in a throughput mode, for cross-support operations.	PSYS-3.1.1-071	PCDA-3.3.1.1-090 PSOC-3.3.2.1-020		D		
PGSL-3.2.2.1-150	The PGS shall be capable of delivering to the Suitland Interface the NOAA-N and then -N' global data at the raw data level, acquired by the PGS CDA stations, in compliance with performance requirements.	PSYS-3.1.1-110	PCDA-3.3.1.1-100 PSOC-3.3.2.1-160		D		
PGSL-3.2.2.1-160	The PGS shall be capable of delivering to the Suitland Interface the NOAA-N and then -N' split-mission global or SAIP or STIP data received at the PGS CDA stations per any of the combinations below. (a) 2 orbits of GAC (b) 1 orbit GAC and 1 orbit of SAIP (c) 1 orbit GAC and 1 orbit of STIP (d) 2 orbits SAIP (e) 1 orbit SAIP and 1 orbit of STIP (f) 2 orbits STIP	.PSYS-3.1.1-110	PCDA-3.3.1.1-110 PSOC-3.3.2.1-170/180/190		A		
PGSL-3.2.2.1-170	The PGS shall be capable of delivering to the Darmstadt Interface, the MHS telemetry data extracted from NOAA satellites global data, via the Communication element, in compliance with performance requirements.	PSYS-3.1.1-160	PCDA-3.3.1.1-020 PSOC-3.3.2.1-010		D		
PGSL-3.2.2.1-180	The PGS shall be capable of acquiring, processing and displaying the NOAA instrument telemetry/housekeeping data from the Darmstadt Interface, received from Metop satellites.	PSYS-3.1.1-170	PSOC-3.3.2.1-040/200		D		
PGSL-3.2.2.1-190	The PGS shall complete the delivery of the Metop global data to the Suitland interface from orbit N before starting the acquisition from orbit N+1, in compliance with performance requirements.	PSYS-3.1.1-150	PCDA-3.3.1.1-120 PSOC-3.3.2.1-210		D		

Require-ment ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.1-200	The PGS shall be capable of delivering to the Darmstadt Interface via a GFT protocol the data needed to preprocess NOAA satellite instrument data (e.g. satellite ephemeris or orbital-state, on-board time correlation, instrument calibration parameters).	PSYS-3.1.1-180	PIPS-3.3.3.2-050		D		
PGSL-3.2.2.1-210	The PGS shall be capable of acquiring from the EPS, via a GFT protocol, the data necessary to preprocess Metop satellite instrument data (e.g. satellite ephemeris or orbital state, on-board time correlation, instrument calibration parameters).	PSYS-3.1.1-190	PIPS-3.3.3.3-020		D		
PGSL-3.2.2.1-220	The PGS shall be capable of ingesting and preprocessing, at full resolution, the common core instrument data extracted from the Metop global data, to NOAA Level 1 data sets.	PSYS-3.1.1-220	PIPS-3.3.3.1-010/020/030/040/070		D		
PGSL-3.2.2.1-221	The PGS shall be capable of ingesting and preprocessing the NOAA satellite blind orbit global data acquired from the Darmstadt Interface.	PSYS-3.1.1-140	PIPS-3.3.3.1-050/080		D		
PGSL-3.2.2.1-222	The PGS shall be capable of ingesting and preprocessing to NOAA Level 1 data set the MHS instrument data from the NOAA satellites global data.	PSYS-3.1.1-220	PIPS-3.3.3.1-050 PIPS-3.3.3.1-080		D		
PGSL-3.2.2.1-230	The PGS shall be capable of generating Level 2 and 3 products from the common core instrument data extracted from the Metop global data.	PSYS-3.1.1-220	PPGD-3.3.4.1-050/060/080		D		
PGSL-3.2.2.1-235	The PGS shall be capable of generating Level 2 and 3 products from the MHS instrument data from the NOAA satellites global data.	PSYS-3.1.1-220	PPGD-3.3.4.1-080		D		
PGSL-3.2.2.1-240	The PGS shall be capable of ingesting and preprocessing to NOAA Level 1 data set the AVHRR instrument and telemetry data extracted from MHRPT data, received by the NOAA CDA stations.	PSYS-3.1.1-210	PIPS-3.3.3.1-060/090		D		
PGSL-3.2.2.1-245	The PGS shall be capable of generating Level 2 and 3 products for the AVHRR instrument and telemetry data (Level 1) extracted from MHRPT data.	PSYS-3.1.1-210	PPGD-3.3.4.1-020		D		
PGSL-3.2.2.1-250	The PGS shall be capable of ingesting (and preprocessing) in pipeline mode, the Metop instrument Level 2 products, acquired from EPS, to meet NOAA user requirements.	TBD, PSYS-3.1.1-220, DAY 2/ Progressive development	PIPS-3.3.3.1-100		D		

Require-ment ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.1-260	The PGS shall be capable of generating Level 2 and 3 products from the Metop Level 1 products received from EPS, to meet NOAA user requirements.	TBD, PSYS-3.1.1-220 DAY 2/ Progressive development	PPGD-3.3.4.1-030		D		
PGSL-3.2.2.1-270	The PGS shall be capable of generating Level 2 and 3 products from the Metop Level 2 products received from EPS, to meet NOAA user requirements.	TBD, PSYS-3.1.1-220, DAY 2/ Progressive development	PPGD-3.3.4.1-040		D		
PGSL-3.2.2.1-280	The PGS shall make available to users, the NOAA Level 1b data sets generated from the Metop satellite global data.	PSYS-3.1.1-230, DAY 2/ Progressive development	PDAA-3.3.5.1-070 PDAA-3.3.5.2-010		D		
PGSL-3.2.2.1-290	The PGS shall be capable of distributing all NOAA Level 2 and 3 products produced by the PGS, from the Metop satellite global data, to users.	PSYS-3.1.1-230, DAY 2/ Progressive development	PPGD-3.3.4.1-100 PDAA-3.3.5.1-080 PDAA-3.3.5.1-090 PDAA-3.3.5.2-010 PPGD-3.3.4.2-040		D		
PGSL-3.2.2.1-300	The PGS shall archive global data and associated databases from the Metop satellite.	PSYS-3.1.1-250	PCDA-3.3.1.4-020 PDAA-3.3.5.1-010 PDAA-3.3.5.1-020 PDAA-3.3.5.1-030 PDAA-3.3.5.1-040 PDAA-3.3.5.1-050 PDAA-3.3.5.1-060 PDAA-3.3.5.4-010		D		
PGSL-3.2.2.1-310	The PGS shall archive all auxiliary, ancillary and metadata for Metop global data.	PSYS-3.1.1-250	PDAA-3.3.5.1-050 PDAA-3.3.5.4-010		D		
PGSL-3.2.2.1-320	The PGS shall archive all Levels 2 and 3 products generated by the PGS from the common core instruments data on the Metop satellite.	PSYS-3.1.1-260	PDAA-3.3.5.1-040 PDAA-3.3.5.1-050 PDAA-3.3.5.1-060 PDAA-3.3.5.4-010		D		
PGSL-3.2.2.1-330	The PGS shall archive all Levels 2 and 3 products generated by the PGS from the Metop instruments data on Metop satellite.	PSYS-3.1.1-260 NOAA Day 2/ Progressive development	PDAA-3.3.5.1-030 PDAA-3.3.5.1-060 PDAA-3.3.5.4-010		D		

Require-ment ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.1-340	The PGS shall provide for telecommunications capabilities among the PGS elements to exchange satellite data and information, reliably and in a timely manner as defined by each of the interconnecting element.	PSYS-3.1.1-020/270	PCOM-3.3.6.1-020/040 PCOM-3.3.6.3-010		D		
PGSL-3.2.2.1-350	The PGS shall provide for telecommunications capabilities between the Suitland and Darmstadt Interfaces, for acquiring from Darmstadt the following data types. (a) NOAA GAC/SAIP/STIP in pipeline mode (b) Metop global data in pipeline mode (c) NOAA TIP/AIP/HRPT in throughput mode (d) NOAA TC Echo in throughput mode.	PSYS-3.1.1-020/275	PCOM-3.3.6.1-010/030 PCOM-3.3.6.3-020 PCOM-3.3.6.4-040		D		
PGSL-3.2.2.1-360	The PGS shall provide for telecommunications capabilities between the Suitland and Darmstadt Interfaces, for transporting to Darmstadt the following data types. (a) NOAA satellite telecommands for NOAA blind orbits and contingency operations in throughput mode (b) MHS instrument and telemetry data.	[PSYS-3.1.1-020/275]	PCOM-3.3.6.1-050 PCOM-3.3.6.3-020 PCOM-3.3.6.4-040		D		
PGSL-3.2.2.1-370	The PGS shall provide telecommunications capabilities among the PGS elements and maintain existing external interfaces including DOD in the IJPS period.	PSYS-3.1.1-020/270	PCOM-3.3.6.1-080 PPGD-3.3.4.3-010 PPGD-3.3.4.3-020 PPGD-3.3.4.3-030 PDAA-3.3.5.3-010 PDAA-3.3.5.3-020		D		
PGSL-3.2.2.1-380	The PGS shall provide instrument calibration databases for both the NOAA and Metop satellites to support product generation needs in the IJPS period.	PSYS-3.1.1-280	PIPS-3.3.3.1-055		D		
PGSL-3.2.2.1-390	The PGS shall integrate into the PGS any unique EUMESAT-provided equipment required to perform commanding, telemetry acquisition, or data handling for the Metop satellites.	PSYS-3.1.3-010	PCDA-3.3.1.1-150		D		
PGSL-3.2.2.1-400	The PGS shall be capable of recording, playing back, and transferring to the Suitland Interface the NOAA satellite STIP, SAIP, and GAC data.	PSYS-3.1.1-110	PCDA-3.3.1.1-130		D		
PGSL-3.2.2.1-410	The PGS shall be capable of recording, playing back, and transferring to the Suitland Interface the GDS data received from Metop satellites.	PSYS-3.1.1-130	PCDA-3.3.1.1-140		D		
	3.2.2.2 Operational						

Require-ment ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.2-010	The PGS shall be capable of supporting IJPS operations upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites.	PSYS-3.1.2-010	PCDA-3.3.1.2-010 PSOC-3.3.2.2-010 PIPS-3.3.3.2-010 PPGD-3.3.4.2-010		D		
PGSL-3.2.2.2-020	The PGS shall provide for a rolling archive of 7 days for the NOAA-N and -N' and Metop global data acquired at the CDA stations.	PSYS-3.1.2-030	PCDA-3.3.1.4-020		D		
PGSL-3.2.2.2-030	The PGS shall conduct day-to-day operations of NOAA satellites in coordination with the EPS ground segment and support joint tasks, including the cross-support and blind orbit support tasks.	PSYS-3.1.2-020	PCDA-3.3.1.2-020 PSOC-3.3.2.2-020/030 PIPS-3.3.3.2-020 PPGD-3.3.4.2-030		D		
PGSL-3.2.2.2-040	The PGS shall provide for Metop telecommand and telemetry data transporting operations, in a throughput mode, for cross-support of operations in compliance with performance requirements.	PSYS-3.1.1-275	PCOM-3.3.6.1-060 PSOC-3.3.2.1-030 PSOC-3.3.2.1-40		D		
PGSL-3.2.2.2-050	The PGS shall transfer NOAA satellite telecommands to the Darmstadt Interface for NOAA blind orbits.	PSYS-3.1.2-040	PSOC-3.3.2.2-060		D		
PGSL-3.2.2.2-060	In the event of data acquisition failure by EPS, the PGS shall make available the backlog GAC or SAIP or STIP data at the Suitland Interface or on tapes, as requested by the EPS ground segment.	PSYS-3.1.2-040	PCDA-3.3.1.2-030 PSOC-3.3.2.2-070/080 PCOM-3.3.6.2-020		D		
PGSL-3.2.2.2-070	In the event of data acquisition failure by EPS, the PGS shall make available the backlog GDS data at the Suitland Interface or on tapes, as requested by the EPS ground segment.	PSYS-3.1.2-040	PCDA-3.3.1.2-040 PCOM-3.3.6.2-020		D		
PGSL-3.2.2.2-080	The PGS shall develop detailed joint plans and procedures with EPS for supporting nominal, contingency and split-mission scenario operations.	PSYS-3.1.2-040	PSOC-3.3.2.2-040 PCOM-3.3.6.2-020		A		
	3.2.2.3 Interface						
PGSL-3.2.2.3-010	The PGS shall be capable of interfacing with the EPS Metop satellites for telemetry and data (downlink) and telecommand (uplink), as defined in AD-5.	PSYS-3.1.3-010	PCDA-3.3.1.3-010/030		D		
PGSL-3.2.2.3-020	The PGS shall provide for a single point Interface at Suitland, known as the Suitland Interface, in support of data exchange, cross support activities and telecommand operations in compliance with performance requirements in Section 3.2.2.4.	PSYS-3.1.3-030	PSOC-3.3.2.3-010 PIPS-3.3.3.3-010 PCOM-3.3.6.1-050		D		

Require-ment ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.3-021	The PGS shall exchange auxiliary and co-ordination data with the EPS ground segment via a "Generic File Transfer (GFT)" protocol.	PSYS-3.1.1-180/270	PSOC-3.3.2.3-020 PIPS-3.3.3.3-020		D		
PGSL-3.2.2.3-025	The PGS shall provide a voice loop for exchange of operational coordination with the EPS ground segment.	PSYS-3.1.3-035	PSOC-3.3.2.3-030		D		
PGSL-3.2.2.3-030	The PGS shall make available to EPS ground segment at the Suitland Interface, the following data types, in compliance with the performance requirements. (a) NOAA GAC data from NOAA-N and -N' acquired by the NOAA CDA station. (If GAC is unavailable, then Stored AIP (SAIP) or Stored TIP (STIP) data.) In case of communications failure, between NOAA and EPS ground segment, PGS shall provide the backlog GAC or SAIP or STIP data on a tape (Standard TBD). (b) Metop GDS data acquired by the NOAA CDA station for EPS blind orbits. In case of communications failure between NOAA and EPS ground segment, PGS shall provide the backlog data on a tape (CLT Tape). (c) Metop telemetry data acquired by the NOAA CDA station for EPS blind orbits. (d) NOAA satellite and instruments auxiliary and coordination data. (e) Metop telecommand echo upon successful transmission of the EPS generated satellite command, by the PGS CDA station.	PSYS-3.1.3-030	PCDA-3.3.1.3-040 PSOC-3.3.2.2-040		D		
PGSL-3.2.2.3-035	The PGS shall provide a data buffering capacity at the Suitland Interface, for data acquired from Fairbanks CDA, to contain a minimum of one complete download of NOAA GAC or SAIP or STIP and one complete download of GDS data, at all times.	PSYS-3.1.3-030	PSOC-3.3.2.2-050 PCOM-3.3.6.3-030		D		
PGSL-3.2.2.3-040	The PGS shall be capable of receiving at the Suitland Interface the Metop telecommand data delivered by EPS ground segment, and transfer it to the Fairbanks CDA station in compliance with performance requirements.	PSYS-3.1.3-030	PCDA-3.3.1.4-100 PSOC-3.3.2.2-040 PSOC-3.3.2.4-070		D		

Require-ment ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.3-050	The PGS shall be operationally compatible to exchange data/information with the Darmstadt Interface at the EPS ground segment.	PSYS-3.1.3-040	PCOM-3.3.6.1-050 PCOM-3.3.6.1-060 PCOM-3.3.6.1-070		D		
PGSL-3.2.2.3-060	The PGS shall acquire from the Darmstadt Interface the following data types, made available by the EPS ground segment: (a) NOAA GAC data from NOAA-N and -N' received by the EPS PCDA station for NOAA blind orbits. (If GAC is unavailable, then Stored AIP (SAIP) or Stored TIP (STIP) data.) In case of communications failure between NOAA and EPS ground segment, the backlog GAC or SAIP or STIP shall be received on a tape (Standard TBD). (b) Metop GDS data acquired by the EPS PCDA station. In case of communications failure between NOAA and EPS ground segment, the backlog data shall be received on a tape (Standard TBD). (c) NOAA TIP/AIP/HRPT real-time data acquired by the EPS PCDA station for NOAA blind orbits. (d) Metop satellite and instruments auxiliary and coordination data as defined in Ad-4 (e) NOAA telecommand echo upon successful transmission of the NOAA generated satellite command, by the EPS CDA station.	PSYS-3.1.3-040	PIPS-3.3.3.2-030		D		
PGSL-3.2.2.3-065	The PGS shall provide a data buffering capacity, for data acquired from Darmstadt Interface, to contain a minimum of one complete download of NOAA GAC or SAIP or STIP data and one complete download of GDS data, at all times.	PSYS-3.1.3-030	PSOC-3.3.2.2-050 PCOM-3.3.6.3-040		D		
PGSL-3.2.2.3-070	The PGS shall be capable of delivering to the Darmstadt Interface the telecommand for uplink to NOAA satellite through the EPS PCDA station, in compliance with performance requirements.	PSYS-3.1.3-040	PSOC-3.3.2.1-130		D		
PGSL-3.2.2.3-080	The PGS shall interface with the EPS External Information Service (EEIS) for the reception of decryption keys for Metop LRPT/HRPT.	PSYS-3.1.3-040	PSOC-3.3.2.2-040 PSOC-3.3.2.2-060		D		

Require-ment ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.3-090	The PGS shall provide/maintain an interface for NOAA user community to access and retrieve short-term and long-term stored/archived data/products from both NOAA and Metop satellites in the IJPS period.	PSYS-3.1.3-050	PDAA-3.3.5.3-030		D		
PGSL-3.2.2.3-100	The PGS shall provide/maintain an interface for the distribution of the NOAA global data, to the Department of Defense in the IJPS period.	PSYS-3.1.3-050	PCOM-3.3.6.1-080		D		
PGSL-3.2.2.3-110	The PGS shall provide/maintain an interface for the distribution of the common core instrument data extracted from Metop global data, to the Department of Defense in the IJPS period.	PSYS-3.1.3-060	PCOM-3.3.6.1-080		D		
PGSL-3.2.2.3-120	The PGS shall be capable of interfacing with any unique EPS provided equipment required for performing commanding, telemetry acquisition or data handling for Metop satellites.	PSYS-3.1.3-010	PCDA-3.3.1.3-020		D		
	3.2.2.4 Performance						
PGSL-3.2.2.4-010	The PGS shall be capable of supporting the launch of a new POES within 120 days of notification.	PSYS-3.1.4-010	PCDA-3.3.1.4-010 PSOC-3.3.2.4-010		A		
PGSL-3.2.2.4-020	The PGS shall provide for an overall system availability of at least 97.5% calculated on an annualized basis.	PSYS-3.1.4-020	PCDA-3.3.1.4-030		A		
PGSL-3.2.2.4-030	The PGS shall provide the NOAA GAC or SAIP or STIP data at the Suitland Interface as defined below: (a) In a time ordered manner (first data in transmitted first) (b) As received with out any processing (c) First data no later than 2 minutes after loss of signal (d) Last data no later than 100 minutes after download completion (e) Data transmitted in a pipeline mode (f) Data format at the interface shall comply with those defined for NOAA KLMN and N' as applicable.	PSYS-3.1.4-020	PCDA-3.3.1.4-040/090 PSOC-3.3.2.4-040/050 PCOM-3.3.6.4-010/020		T		

Require-ment ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.4-040	The PGS shall provide the Metop blind orbit global data at the Suitland Interface as defined below: (a) In a time ordered manner (first data in transmitted first) (b) Reed-Solomon error decoded and quality flag appended (c) Data in the VCDU format (d) UTC time stamp appended (e) First data no later than 2 minutes after download completion (f) Last data no later than 100 minutes after download completion (g) Data available in a pipeline mode.	PSYS-3.1.4-020	PSOC-3.3.2.1-090 PCDA-3.3.1.1-060 PCDA-3.3.1.1-030		T		
PGSL-3.2.2.4-050	The PGS shall deliver 98.8% the NOAA GAC or SAIP or STIP data acquired to the Suitland Interface, measured over any 30 day period.	PSYS-3.1.4-020	PCDA-3.3.1.4-090 PCOM-3.3.6.4-010		A		
PGSL-3.2.2.4-060	The PGS shall deliver 98.8% the Metop global data acquired to the Suitland Interface, measured over any 30-day period.	PSYS-3.1.4-020	PCDA-3.3.1.4-070 PCDA-3.3.1.4-080 PCOM-3.3.6.4-010		A		
PGSL-3.2.2.4-070	The PGS shall deliver the Metop blind orbit telemetry (TM) data to the Suitland Interface as defined below: (a) Data available in a throughput mode (b) UTC time stamp appended, with accuracy better than 100 micro-secs. (TBC) and format to conform to the EPS Product Conventions Document [EPS/SYS/TEN/990007] (c) NOAA shall not alter the content of the TM frames (d) Ensure that 98.8% of TM Downlink successfully transferred over a 30 day period (e) The delay between the TM Frame complete acquisition and its availability at the interface shall be less than 1 second (f) Maximum downtime of the TM transport chain between the CDA station and the interface shall not exceed 100 minutes (g) Format conform to the layers defined by the Metop Space to Ground Interface document, allows FOP-1 by EPS CGS, and identify originating satellite (h) Interface shall comply with EPS CGS common TM/TC interface standard (TBD).	PSYS-3.1.4-020	PCDA-3.3.1.4-070 PSOC-3.3.2.4-060		T		

Require-ment ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.4-080	The PGS shall not exceed a 360 minutes maximum downtime limit for the NOAA CDA station to the Suitland Interface data delivery chain.	PSYS-3.1.4-020	PCDA-3.3.1.4-050 PSOC-3.3.2.4-020 PCOM-3.3.6.4-030		A		
PGSL-3.2.2.4-090	The PGS maximum command transport chain downtime from the Suitland Interface to the CDA station shall not exceed 100 minutes.	PSYS-3.1.4-020	PCDA-3.3.1.4-060 PSOC-3.3.2.4-030		A, T		
PGSL-3.2.2.4-100	The PGS shall be capable of delivering to the Darmstadt Interface, the MHS telemetry data extracted from NOAA satellites global data, via the communication element as defined below. (a) Transfer in throughput mode (b) Data format as extracted from the satellite data.	PSYS-3.1.4-020	PSOC-3.3.2.1-180 PSOC-3.3.2.1-190		D		
PGSL-3.2.2.4-110	The PGS shall complete product processing of the AVHRR instrument and telemetry data (extracted from MHRPT over NOAA CDA) and deliver product to users in less than 30 minutes from observation.	PSYS-3.1.4-030	PCDA-3.3.1.1-025 PCDA-3.3.1.1-030 PCOM-3.3.6.1-010 PIPS-3.3.3.1-060 PPGD-3.3.4.1-020		A		

ACRONYMS

AAS	Archive & Access System
AD	Applicable Document
A-DCS	Advanced DCS
AFSCN	Air Force Satellite Control Network
AFSCN	Air Force Space Communications Network
AMSU-A	Advanced Microwave Sounding Unit-A
ARGOS	Advanced Data Collection and Location System
ASCAT	Advanced Scatterometer
ATN	Advanced TIROS-N
AVHRR	Advanced Very High Resolution Radiometer
CCSDS	Consultative Communications Committee for Space Data Systems
CDA	Command and Data Acquisition
CEMSCS	Central Environmental Satellite Computer System
CGS	Core Ground Segment (EUMETSAT)
COMM	Communications
DCS	Data Collection and Location System
DOD	Department of Defense
EEIS	EUMETSAT External Information Service
EPS	EUMETSAT Polar System
ESA	European Space Agency
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
GAC	Global Area Coverage (NOAA global data)
GDS	Global Data Stream (Metop global data)
GFT	Generic File Transfer
GOME	Global Ozone Monitoring Experiment
GPS	Global Positioning System
GRAS	Global navigation satellite system Receiver for Atmospheric Sounding
HIRS	High-Resolution Infrared Sounder
HRPT	High Resolution Picture Transmission
IASI	Infrared Atmospheric Sounding Interferometer
ICD	Interface Control Document
ID	Identifier
IJPS	Initial Joint Polar-orbiting Operational Satellite System
IPD	Information Processing Division
IPO	Integrated Program Office
IPS	Information/Data Processing
IR	Infrared
IRD	Interface Requirement Document
JORP	Joint Operations, Rules, and Procedures
LEO	Launch & Early Orbit
LRPT	Low Resolution Picture Transmission
LST	Local Solar Time
Metop	Meteorological Operational Satellite
MHS	Microwave Humidity Sounder

MOA	Memorandum of Agreement
NASA	National Aeronautics and Space Administration
NCDC	National Climatic Data Center
NESDIS	National Environmental Satellite, Data and Information Service
NOAA	National Oceanic and Atmospheric Administration
NODC	National Oceanographic Data Center
NWS	National Weather Service
ORA	Office of Research and Applications
OSD	Office of Systems Development
OSDPD	Office of Satellite Data Processing and Distribution
OSO	Office of Satellite Operations
PCDAS	EUMETSAT Polar Command and Data Acquisition Station
PGD	Product generation & Distribution Systems
PGDS	Product Generation & Distribution Systems
PGS	POES Ground Segment
PGS	POES Ground Segment
PIP	Program Implementation Plan
POES	Polar-orbiting Operational Environmental Satellite
RD	Reference Document
RDE	Reference Document EUMETSAT
RDN	Reference Document NOAA
RF	Radio Frequency
RTVM	Requirement Traceability & Verification Matrix
S&R	Search and Rescue
SAA	Satellite Active Archive
SAIP	Stored AIP
SARP	Search and Rescue Processor
SARR	Search and Rescue Repeater
SARSAT	Search and Rescue Satellite
SARSSL	Search and Rescue Satellite-Aided Tracking
SBUV	Solar Backscatter Ultra Violet
SCR	System Commissioning Review
SEM	Space Environment Monitor
SLVS	Satellite Launch Vehicle System
SN	Space Network
SOCC	Spacecraft Operations Control Center
STIP	Stored TIP
TBC	To be confirmed
TBD	To be determined
TBS	To be supplied
TBW	To be written
V&V	Verification & Validation
VCDU	Virtual Channel Data Unit